Communities and Interactions in Nineteenth-Century Scottish and English Toxicology

Holly Easton

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Department of History, University of Canterbury

Supervisors: Heather Wolffram and David Monger

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Abstract

The nineteenth century was a crucial period of development for toxicology in Britain, during which several great toxicologists rose to prominence. These toxicologists facilitated the creation of communities and intellectual networks of toxicology that operated throughout Scotland and England. Despite this crossover, previous scholarship has tended to focus on either Scotland or England, rather than both together. In assessing toxicology in both countries, this thesis aims to provide a new perspective on toxicology as it was used in criminal investigations. By tracking the development of toxicology over the nineteenth century in Scotland and England, this thesis examines how different aspects of toxicology were performed both within and across national borders. Despite the pressures exerted by the different national frameworks of law and education in each country, toxicology developed along a similar trajectory in each, a process that is examined using two toxicologists as focal points. Robert Christison and Alfred Swaine Taylor were the most eminent toxicologists in Scotland and England respectively, and through their positions of authority had enormous influence over the growing body of toxicology practitioners. This thesis uses them to examine the communities and intellectual networks that emerged within the body of toxicology practitioners, and changes in toxicological practice. This approach reveals the interdependency of expert toxicologists and ordinary practitioners across Britain. The writings of Christison, Taylor, and other toxicologists in medical journals and textbooks are the most important sources in this thesis, because they allow reconstruction of the situations and reactions of ordinary medical men, who made up the bulk of toxicology practitioners.

Introduction

> But in medical jurisprudence, more than in any other medical sciences, the experiences of any single individual, how great soever it may be, is but a feeble light to guide his steps, when compared with the vast accumulated stores of the records of medicine.[1]

In the first edition of his textbook, Scottish toxicologist Robert Christison described his first foray into toxicology as an endeavour impossible to undertake alone. He referred specifically to his use of French and German records and research, but the sentiment that toxicology was not an individual pursuit was repeated by toxicologists throughout the century. This thesis examines the communities of toxicology practitioners that formed in Scotland and England over the nineteenth century, with a focus on the interactions that occurred between expert toxicologists and the ordinary medical men who practised toxicology without special training. These interactions forged networks within and across these communities that shaped the development of toxicology, and were in turn shaped by the peculiarities of the British context.

The two most famous toxicologists of Scotland and England are focus points for this thesis. Robert Christison (1798-1882) made toxicology a respectable subject of study in Scotland. He was a frequent expert witness in court, he wrote the first British treatise on poisoning, and contributed prolifically to the medical journals.[2] Alfred Swaine Taylor (1806-1880) was Christison's English counterpart. He, too, was a medical jurist, textbook author

[1] Robert Christison, *A Treatise on Poisons: In Relation to Medical Jurisprudence, Physiology, and the Practice of Physic* (Edinburgh: Adam Black, 1829) xiii.
[2] M. Anne Crowther, 'The Toxicology of Robert Christison: European Influences and British Practice in the Early Nineteenth Century,' in *Chemistry, Medicine, and Crime, Mateu J. B Orfila (1787-1853) and His Times* eds. José Ramon Bertomeu-Sánchez and Agustí Nieto-Galan (Sagamore Beach: Science History Publications, 2006); Robert Christison, *The Life of Sir Robert Christison, bart.,* 1 (Edinburgh: W. Blackwood and Sons, 1885).

and contributor to the medical journals.[3] Historians justifiably credit these men with enormous influence over the development of toxicology, but this thesis seeks to deviate from the narrative in assessing how they were influenced by their inferiors; namely, the medical men who looked to them as authorities. The ordinary medical men of Scotland and England were called upon to perform toxicology in poisoning cases, and although they lacked the expertise of Christison and Taylor, they were equally important in the development of toxicology.[4] The interactions between these men created communities of toxicology practitioners, bound together by the need to cope with the difficulties of performing toxicology as required by the law.

Previous scholarship on British toxicology has usually been restricted to analysis of Scotland or England, rather than both. This has created an opportunity to assess Scotland and England together, and fill a gap in the scholarship. James Secord discusses the benefits and drawbacks of comparative histories of science, using countries as units for comparison. While they can contribute to the currently lacking global picture of scientific development, equally they can 'reaffirm national boundaries'.[5] This thesis circumvents this pitfall, by identifying both how these boundaries created national division and how they facilitated interaction and development across countries. Moreover, country-based comparison is particularly relevant when assessing toxicology, as it was strongly affected by national systems, like law and education.

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[3] Noel G. Coley 'Alfred Swaine Taylor, MD, FRS (1806-1880): Forensic Toxicologist,' *Medical History* 35, no. 4, (1991): 409-27.
[4] Irvine Loudon, *Medical Care and the General Practitioner 1750-1850* (Oxford: Clarendon Press, 1986); David Hamilton, *The Healers: A History of Medicine in Scotland* (Edinburgh: Canongate, 1987).
[5] James Secord, 'Knowledge in Transit,' *Isis*, 95, no. 4 (2004): 669.

Several historians have examined aspects of English toxicology. Ian Burney has taken an interdisciplinary approach, focussing on the struggles toxicologists faced in conveying their science to the courts and public. His largest work on toxicology discusses the conceptualisation of poisoning and toxicology in Victorian England, and the famous trial of William Palmer.[6] He also addresses laws of evidence and the 'normal arsenic' controversy, both of which had a significant effect on how toxicologists operated in the courtroom.[7] This thesis utilizes his concept of the tiered internal structure of toxicology, as it is a useful framework for assessing how interactions took place between practitioners of different skill levels. Katherine Watson has approached English toxicology as a social historian, examining the victims and perpetrators of poisoning crime. Her analysis of court records is especially relevant to this thesis, as she examines how ordinary medical men became involved as expert witnesses in poisoning cases.[8] Watson's discussion of these men and their changing role in trials provides important context for this thesis, which argues for the importance of these men in influencing toxicological practice. Additionally, her work on forensic medicine provides broader context for Scottish and English developments.[9]

M. Anne Crowther is the most prominent historian of Scottish toxicology. Crowther and Brenda White have written on medical jurisprudence at Glasgow, which contributes to both the history of Scottish toxicology and forensic science history more broadly.[10] They

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[6] Ian Burney, *Poison, detection and the Victorian imagination*, (Manchester: Manchester University Press, 2004). For the Palmer trial see: George Knott and Eric Watson eds., *Trial of William Palmer*, 2nd ed., (London: William Hodge and Company, Limited, 1923).

[7] Ian Burney, 'Bones of Contention: Mateu Orfila, Normal Arsenic and British Toxicology,' in *Chemistry, Medicine, and Crime, Mateu J. B Orfila (1787-1853) and His Times*, J. R. Bertomeu-Sánchez and A. Nieto-Galan, eds., (Sagamore Beach: Science History Publications, 2006): 243-259.

[8] Katherine Watson, 'Medical and Chemical Expertise in English Poisoning Trials, 1750-1914,' *Medical History*, 50, (2006): 373-390; Katherine Watson, *Poisoned Lives: English Poisoners and their Victims* (London: Hambledon and London, 2004).

[9] Katherine Watson, *Forensic Medicine in Western Society*, (Abingdon: Routledge, 2011).

[10] M. Anne Crowther and Brenda White, *On Soul and Conscience: the Medical Expert and Crime* (Aberdeen: Aberdeen University Press, 1998).

argue that Christison began a strong tradition of expert witnessing at Edinburgh, which produced Scotland's most eminent nineteenth-century toxicologists, but despite this, medical jurisprudence was never a stable university subject. Crowther has also assessed Christison's efforts to make his name as a toxicologist and make toxicology a discipline valuable to law.[11] She discusses the methods he used to set himself apart from Continental toxicologists, which is especially relevant to the discussions of authority in Chapter Three. Scottish toxicology has received less attention than English toxicology, and other works this thesis utilizes tend to be biographical accounts of prominent figures in Scottish toxicology, rather than the discipline itself.[12]

Other areas of scholarship relevant to toxicology also tend to follow the national divide. Histories of the Scottish and English medical and legal professions are usually separate, but similar themes of professionalization and consolidation are visible in each. The development of the medical professions in each country was inherently connected with the development of toxicology, as the changing place of toxicology in medicine dictated how competent ordinary practitioners were. Historians who have assessed the English medical profession, including Irvine Loudon, Jeanne Peterson, and Charles Newman, make similar arguments about the slow erosion of medical divisions, along with increasing specialisation and professionalization.[13] These developments negatively affected toxicology in medical education and practice. Historians of the Scottish medical profession, including David

[11] Crowther, 'The Toxicology of Robert Christison,' 125-52.
[12] Matthew Kaufman, 'Origin and history of the Regius Chair of Medical Jurisprudence and Medical Police established in the University of Edinburgh in 1807,' *Journal of Forensic and Legal Medicine* 14, no. 3, (2007): 121-130; H. P. Tait, 'Sir Henry Duncan Littlejohn: Great Scottish Sanitarian and Medical Jurist,' *The Medical Officer*, 108, (1962): 183-190.
[13] Loudon, *Medical Care*; M. Jeanne Peterson, *The Medical Profession in Mid-Victorian London* (California: University of California Press, 1978); Charles Newman, *The Evolution of Medical Education in the Nineteenth Century* (London: Oxford University Press, 1957).

Hamilton, Brenda White, Marguerite Dupree, and Crowther, have revealed similar patterns of development in Scotland, despite significant differences in the Scottish medical and education systems.[14] Although toxicology in Scotland began earlier and with strong expert backing, it struck the same problems as its English equivalent, creating similar situations for toxicology practitioners in both countries. These parallels are extremely important, as they provide the basis for comparison of the two countries.

Legal frameworks were also integral to toxicology, as they dictated the place of toxicology and its practitioners in court. Overviews of the legal systems of Scotland and England are important for understanding the legislative bases of each country.[15] However, more important are histories relating to expert witnesses and death investigation in each country, as these areas required the involvement of toxicology practitioners. In the English case, Thomas Forbes assesses expert witnesses at the Central Criminal Court, while Burney discusses inquests.[16] Crowther has assessed Scottish legal practice and Paul Riggs has studied the Scottish court system and death investigation.[17] These works provide essential foundations for examining the place of toxicology in both countries.

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[14] Hamilton, *The Healers*; Brenda White 'Training Medical Policemen: forensic medicine and public health in nineteenth-century Scotland,' in *Legal Medicine in History,* eds. Michael Clark and Catherine Crawford, (Cambridge: Cambridge University Press, 1994): 145-166; M. Anne Crowther and Marguerite W. Dupree, *Medical Lives in the Age of Surgical Revolution* (Cambridge: Cambridge University Press, 2007).

[15] See: David Bentley, *English Criminal Justice in the Nineteenth Century* (London: The Hambledon Press, 1998); Lindsay Farmer, *Criminal Law, Tradition and Legal Order: Crime and the genius of Scots Law, 1747 to the present* (Cambridge: Cambridge University Press, 1997).

[16] Thomas R. Forbes, *Surgeons at the Bailey: English Forensic Medicine to 1878* (New Haven: Yale University Press, 1985); Ian Burney, *Bodies of Evidence: Medicine and the Politics of the English Inquest, 1830-1926* (Baltimore: John Hopkins University Press, 2000).

[17] Paul Riggs, 'Prosecutors, Juries, Judges and Punishment in Early Nineteenth-Century Scotland,' *Journal of Scottish Historical Studies*, 32, no. 2, (2012): 166-189; M. Anne Crowther, 'Crime, Prosecution and Mercy: English Influence and Scottish Practice in the early Nineteenth Century,' in *Kingdoms United? Great Britain and Ireland since 1500* ed. Sean Connolly, (Dublin: Four Courts Press, 1999), 225-238.

The interactions this thesis focuses on occurred when practitioners of toxicology communicated with one another on the subject of toxicology. The nature of toxicology, as a technically complex science that most practitioners were forced into during poisoning cases, ensured interactions were frequent throughout the century. Interactions are not an academic framework in the same way that the intellectual networks discussed in Chapter Three are, however, the analysis in this thesis and many of the frameworks used are predicated upon the importance of intra-professional interaction, and are analysed through examples of interaction. Secord argues that communication in all forms is part of the process of knowledge making, which means 'thinking always about every text, image, action, and object as the trace of an act of communication, with receivers, producers, and modes and conventions of transmission.'[18] This thesis argues that the significance of communication and thus interaction in nineteenth-century toxicology is that in building a body of knowledge, they were building the profession itself.

The interactions displayed in media like the medical journals are constitutive of the profession. This thesis utilizes media that display interactions between toxicology practitioners, both directly and indirectly. Medical journals are especially useful for this, as they facilitated interaction on a large scale and allowed for reaction and reply within their pages. Historians including M. Jeanne Peterson and Brittany Pladek have studied the value of medical journals as historical sources. Peterson's survey of medical journals and Pladek's discussion of *The Lancet* both reveal the value of medical journals as 'literary and social documents.'[19] Journals including the *British Medical Journal (BMJ), The Lancet, Edinburgh*

[18] Secord, 'Knowledge in Transit,' 661.
[19] M. Jeanne Peterson, 'Medicine,' In J. Don Vann and Rosemary T. VanArsdel eds. *Victorian Periodicals and Victorian Society*, (Buffalo: University of Toronto Press, 1994), 22-44; Brittany Pladek, '"A Variety of Tastes":

Medical and Surgical Journal (EMSJ), and *Guy's Hospital Reports (GHR)* feature prominently, because they frequently published on toxicology and toxicologists published in them. Several of the journals this thesis uses, like *The Lancet*, have been reprinted and bound in volumes, which has ensured the survival and accessibility of these works. This process means there are some differences between the reprints and originals, but they are minor, and thus do not create a methodological issue in terms of content.[20] Another valuable source is toxicology textbooks, as not only did they disseminate toxicological information to the wider medical profession, but also because the ways they change over time shows the influence of medical men on the toxicologist authors. Scientific publishing has been assessed by historians including Secord and Jonathan Topham. They describe scientific texts as being affected by audiences and publishing processes just as much as authors.[21] Therefore, they can provide insight into professions through revealing the relationships between audiences and authors. This thesis uses this concept to assess how these relationships changed over time through comparing different editions of toxicological textbooks.

This thesis argues that the exchange between ordinary medical men and expert toxicologists was hugely influential in shaping the development of the profession, and should supplant a simple top-down perception of influence. Furthermore, despite the differences in national systems of education and law, Scotland and England developed overlapping networks that encouraged the parallel development of toxicology. Chapters

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The *Lancet* in the Early-Nineteenth-Century Press,' *Bulletin of the History of Medicine*, 85, no. 4 (2011): 560-586.

[20] For an example of the extent of these alterations, see: 'Preface to the Third Edition,' *The Lancet*, 3rd ed., 1, (1823-24): vii. Pagination differences is the most significant issue that arises from using bound volumes, this thesis uses the pagination of whichever version of the medical journals is available.

[21] Jonathan Topham, 'Scientific Publishing and the Reading of Science in Nineteenth-Century Britain: A Historiographical Survey and Guide to Sources,' *Studies in History and the Philosophy of Science*, 31, no. 4, (2000): 559-612; Secord, 'Knowledge in Transit,' 654-672.

One and Two focus on comparing Scotland and England, in order to provide context for why toxicology developed differently in each country, and to show how national systems created the conditions conducive to the formation of intra-professional networks. Chapter One outlines the evolution of medical education in Scotland and England, with reference to how toxicology was taught over the century. The differences in medical education explain why toxicology developed earlier in Scotland than England, but similar attitudes towards toxicology as a subject of study meant most medical graduates were not equipped to perform toxicology without help. Chapter Two examines the legal systems of Scotland and England, with attention to how expert witnesses became an integral part of poisoning trials. Scottish law institutionalized interactions from the beginning of the century, but English law did not. However, in both countries, the danger courtrooms posed to the reputations of medical men encouraged them to seek assistance from experts.

Chapters Three to Five assess different aspects of toxicology in both countries, with more emphasis on overlap and parallel development than comparison. These chapters focus on interaction within and between practitioners of different skill levels and countries, with the aim of showing how influential interactions were in shaping the profession. Chapter Three assesses how Robert Christison and Alfred Swaine Taylor cultivated authority as toxicologists through their interactions with ordinary practitioners. Both men attempted to portray themselves as separate from Continental toxicologists and superior to ordinary British medical men through their own research. This separation of toxicology practitioners into tiers dictated how they interacted for the rest of the century. Chapter Four examines the networks of interaction directly, with attention to how they proliferated national communities and operated across borders. It constructs networks as public and private, and argues that the private networks maintained by toxicologists gave them far more influence

over court cases than official records show. Chapter Five discusses the issues toxicologists faced in court, specifically those surrounding definitions of evidence. Toxicologists' failure to articulate clear guidelines for dealing with evidence, combined with the realisation that ordinary medical men were seldom capable of performing toxicology alone, led to toxicologists encouraging medical men to seek qualified help in all poisoning cases. This represented both a complete reversal of their attitudes towards ordinary medical men in the early decades of the century, and the rise of professionalized branches of experts taking the place of single expert toxicologists.

Chapter One: Toxicology and Tertiary Education

Tertiary medical education in Scotland and England introduced medical men to toxicology through medical jurisprudence. The training they received in tertiary institutions shaped how they practiced toxicology in their careers, because it determined their level of competency in the subject, and introduced them to the medical communities that were an important aspect of toxicological practice. The majority of prominent British toxicologists held academic posts, ensuring that medical training was closely tied to how toxicology was practised by medical practitioners. Medical training differed between Scotland and England throughout the century, but grew significantly closer in practice from 1850 on. This convergence reflected and guided similar development in toxicology. Changes in law and medical accreditation supported the spread of toxicology as a subject of study. However, the rise of public health in medical training detrimentally affected toxicology, and contributed to the decline of medical jurisprudence in education.

Because toxicology was not a standalone subject, rather a part of the larger subject medical jurisprudence, it is necessary to examine the purpose and constitution of medical jurisprudence. Alternatively named forensic medicine or state medicine, medical jurisprudence taught medical men about subjects that their professional status qualified them to give evidence on in criminal investigations. These included any cases of deaths or injuries that could be brought to trial, which ranged from cases of standard assault to strangulation, infanticide, rape, and insanity, to specific areas, including drowning, starvation, burning, and hanging. Crowther and White describe the ‘usual nineteenth century pattern’ of making toxicology the central part of courses in medical jurisprudence,

which is clear in both Scotland and England.[22] Christison argued that the investigation of poisoning deaths relied more heavily on complex medical evidence than other types of death, and that this, combined with recent developments in toxicology, made it one of the most important parts of medical jurisprudence.[23] Medical jurisprudence was institutionally paired with medical police, which became more commonly referred to as public health. This attachment had considerable influence over the development of medical jurisprudence in education, as professors and lecturers chose how to divide their time and energy between both subjects according to individual preferences.

Scotland, 1800-49

Any assessment of the foundations of toxicology in Britain must begin with the University of Edinburgh, which instituted Britain's first course in medical jurisprudence. By the opening of the nineteenth century, the University's prestige had slipped, and financial inadequacies were worsening due to the decline in student numbers. Jack Morrell asserts that the professors of the early nineteenth century depended on the fees of the students attending their courses for the bulk of their earnings, due to inadequate university-provided salaries. To ensure their financial security, faculty members often refused to retire, made nepotistic staff appointments, and spent as little money on class costs as possible.[24] This had consequences for how medical students were educated, for example, Christison and James Syme formed their own practical chemistry club because Edinburgh's chemistry lecturer, Thomas Hope, excluded practical chemistry from his syllabus for financial reasons.[25]

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[22] Crowther and White, *Soul and Conscience,* 19-20.
[23] Christison, *Treatise*, v.
[24] Jack Morrell, 'The University of Edinburgh in the Late Eighteenth Century: Its Scientific Eminence and Academic Structure,' *Isis*, 62, no. 212 (1970): 161, 164.
[25] Jack Morrell, 'Practical Chemistry in the University of Edinburgh, 1799-1843,' *Ambix*, 16, no. 1-2, (1969): 70. James Syme became a famous surgeon.

Deficiencies like this encouraged medical students to continue their studies at Continental universities, exacerbating issues of remuneration for the universities. The financial implications of instituting a new subject at any of the universities alone created opposition and backlash amongst the existing faculty members, which was compounded by issues of familial and political patronage. To an extent these issues explain why even Scotland, which was at the forefront of the British shift into medical jurisprudence, still lagged behind developments on the Continent.

Until the 1830s, the University of Edinburgh was the only university in Britain with a formalised course in medical jurisprudence.[26] Continental universities were much further advanced, as medical jurisprudence was a fully-fledged subject in the German states by the middle of the eighteenth century, and being taught in France by the 1790s, but practised for significantly longer.[27] Despite this, at Edinburgh and other Scottish universities, the establishment of toxicology under the broader subject of medical jurisprudence and medical police was by no means simple. Medical police was regarded with suspicion in Britain, because it was associated with radical ideas of government interference in the business of individuals.[28] The foundation of Britain's first course in medical jurisprudence and medical police was a result of Andrew Duncan senior's efforts at Edinburgh coinciding with a favourable political swing. Although he had been giving lectures on the subject since 1795, the Tory government rejected the proposed chair of the subject, as medical police was a radical theory, and Duncan was a Whig.[29] George Rosen asserts that Duncan's initial lectures were modelled directly on Johann Peter Frank's treatise on medical police, *Medicinische*

[26] Watson, *Forensic Medicine,* 58.
[27] Ibid, 51-6.
[28] Crowther and White, *Soul and Conscience*, 8-9.
[29] Ibid, 9.

Polizey, which reflected his emphasis on public health over medical jurisprudence.[30] The conjoined nature of the subjects proved important in the way toxicology was taught across Britain for the rest of the nineteenth century. Crowther explains the slow adoption of medical jurisprudence in Britain as being due to the same political suspicions of medical police that had stalled implementation of the subject in Edinburgh.[31]

In 1822, Christison was appointed to the Chair of Medical Jurisprudence and Medical Police at Edinburgh. His predecessors, Andrew Duncan junior and William Alison, had focussed on the public health side of the course, but Christison took the opposite approach, abandoning medical police in favour of jurisprudence.[32] He described toxicology as 'the most promising subject for bringing… medical jurisprudence… into notice.'[33] Fifteen of the forty-four pages of his 1826 syllabus for the course related directly to toxicology.[34] The first edition of Christison's *Treatise on Poisons* was published in 1829, and Burney argues that by this point Christison was undoubtedly the leader of his field.[35] His lectures and early work were heavily influenced by work being done by Continental toxicologists, including François Magendie and Mateu Orfila. In his autobiography, Christison described the slow growth of the number of students taking his class, which he believed was due to his focus on medical jurisprudence.[36] His efforts made the subject financially tenable and supported his

[30] George Rosen, 'The Fate of the Concept of Medical Police 1780-1890,' *Centaurus*, 50, no. 1-2, (2008 reprint): 56.
[31] Crowther, 'The Toxicology of Robert Christison,' 126-7.
[32] Kaufman, 'Origin and history of the Regius Chair,' 123-4.
[33] Robert Christison, *The Life of Sir Robert,* 1, 295.
[34] Robert Christison, *Syllabus of the University Course of Lectures on Medical Jurisprudence* (Edinburgh: A. Balfour & Co., 1826).
[35] Ian Burney, *Victorian Imagination,* 41.
[36] Christison, *The Life of Sir Robert*, 1, 282.

argument that it was an important subject. By 1833, the subject was a compulsory part of medical examinations at Edinburgh.[37]

After Christison made medical jurisprudence and medical police a success at Edinburgh, other institutions began to follow. Several extramural medical schools began to offer medical jurisprudence as a subject around the same time as Edinburgh, but it had to be forced upon the University of Glasgow by the Crown in 1839.[38] Despite this success, attempts to create broader reforms in tertiary education in the first half of the century were generally unsuccessful. The 1829 Scottish Universities Commission was one of the first attempts to initiate reform within the reluctant universities, assessing whether bringing the Scottish universities in line with the English universities would improve their performance. The Report's overall conclusion was that no attempt should be made to anglicize Scottish universities.[39] Instead, changes in the teaching of toxicology relied more on the individuals involved in teaching the subject and systems of accreditation, rather than university organisation or structures of teaching. Brenda White traces these swings in teaching medical jurisprudence or medical police through Edinburgh's Chair, which occurred solely due to individual lecturers' preferences.[40] Only later in the century were attempts made to bring professors with their own teaching agendas to heel.

England, 1800-49

At the close of the eighteenth century in England, there was no attempt to insert medical jurisprudence into the medical curriculum. England lagged behind Scotland by

[37] Crowther and White, *Soul and Conscience*, 7.
[38] Ibid, 12, 15. The history of medical jurisprudence at Glasgow is covered in detail in Crowther and White.
[39] Scottish Universities Commission, *Report made to His Majesty by a Royal Commission of Inquiry into the State of the Universities of Scotland*, (House of Commons, 1831), 11.
[40] White 'Training Medical Policemen,' 145-166.

nearly three decades in teaching the subject, and only in the second half of the nineteenth century was any kind of parity achieved. Medical training and practice were largely unregulated in England. The degree to which medical men received training differed hugely, and as Loudon describes, the difference between medical practitioners trained by orthodox methods in hospitals and universities, and those trained by apprenticeship or less formal methods, was not easily discernible.[41] Nepotism affected the quality of teaching in the universities, and persisted stubbornly into the last decades of the century.[42] Even where students undertook formal training, standardisation was non-existent, with training differing vastly between competing institutions. Watson notes that only Oxford and Cambridge offered medical degrees, the training for which bordered on the ridiculous, causing many potential doctors to travel to Edinburgh or Continental universities for formal qualifications.[43] This changed as more universities were founded over the next three decades that offered medical degrees, while extramural schools and teaching hospitals also instituted competing courses of study. This perhaps explains why the most eminent English toxicologists, like Taylor, Henry Letheby, William Herapath, and Thomas Nunneley, emerged from either English teaching hospitals and medical schools, or Scottish universities, rather than the antiquarian English universities.

As in Scotland, English toxicology was taught as part of a larger course encompassing other areas of medico-legal interest, and public health. The first course was instituted at the University of London in 1829, but was strikingly unsuccessful, resulting in the resignation of

[41] Loudon, *Medical Care,* 13.
[42] Michael Sanderson, *The Universities in the Nineteenth Century* (London: Routledge and Kegan Paul Ltd, 1975), 28.
[43] Watson, *Forensic Medicine*, 56.

the first professor of the subject.[44] The 1830 syllabus published by his immediate successors, the joint professors of medical jurisprudence Anthony Todd Thomson and Andrew Amos, shows that toxicology was a much smaller part of the course than it was for Christison in Edinburgh.[45] The course was structured to cater to not only medical students, but also law students, something Thomson made clear in his opening lecture: 'I will endeavour, for the sake of those gentlemen of the law… to make the anatomical descriptions and the physiological discussions as intelligible as possible.'[46] Christison and Taylor's textbooks also reflected this tendency to address law students as well as medical students.[47] This interdisciplinary crossover likely contributed to how rapidly the legal profession adapted to manipulating experts and their evidence in court. In any case, toxicology became far more prominent after 1830, due largely to developments outside of the universities.

Changes within the rules of the governing bodies of medicine in England strongly affected the teaching of toxicology in England. These external pressures were more important for the development of the subject in England than the internal machinations that dictated the policies of the Scottish universities. Crawford explains the role medical periodicals played in the early decades of the nineteenth century in calling for greater support for medical jurisprudence amongst the medical community, which coincided with the English anxiety over the poor state of medical science in the same period described by

[44] Coley, 'Alfred Swaine Taylor,' 412.
[45] Andrew Amos and Anthony Todd Thomson, *Lectures on Medical Jurisprudence in the University of London* (London: Joseph Mallett, 1830), 7-12.
[46] Anthony Todd Thomson*, Lecture, introductory to the course of medical jurisprudence, delivered in the University of London, on Friday, January 7, 1831* (London: John Taylor, 1831), 30.
[47] Alfred Swaine Taylor, *A Manual of Medical Jurisprudence* (London: John Churchill, 1844), vi; Christison, *Treatise,* 61.

John Warner.[48] It is reasonable to suggest that this climate, with reform being urged from within the profession and a fear that English medicine was not up to the standards of its Continental counterparts, encouraged the adoption of medical jurisprudence. The Society of Apothecaries, College of Surgeons, and Society of Physicians, were responsible for several changes in the study and regulation of medical training and practice. The first legislative attempts to achieve some form of regulation came in 1815, but a more important change occurred in 1829 when the Society of Apothecaries made medical jurisprudence a pre-requisite subject of study for candidates for the Society's accreditation. Crawford states that by this time approximately 400-450 students sought accreditation from both the Society of Apothecaries and the College of Surgeons, meaning a significant proportion of English medical men were compelled to have basic training in medical jurisprudence.[49] Because accreditation from these societies was one of the few ways for Scottish graduates to practice in England, they had significant influence.[50]

It was during this period of rapid growth within medical jurisprudence that Taylor accepted the newly created post of Lecturer in Medical Jurisprudence at Guy's Teaching Hospital in 1831.[51] Noel Coley asserts that Taylor's lectures contained toxicology from the very beginning, which is unsurprising when considering the extent to which he built his reputation on toxicology in the following years.[52] Taylor's contribution to the teaching of

[48] Catherine Crawford, 'A scientific profession: medical reform and forensic medicine in British periodicals of the early nineteenth century,' in *British Medicine in an Age of Reform* (eds.) Roger French and Andrew Wear, (London: Routledge, 2005), 203-5; J. H. Warner, 'The idea of science in English medicine: the 'decline of science' and the rhetoric of reform, 1815-45,' in French and Wear (eds.) *British Medicine*, 136-137.
[49] Crawford, 'A scientific profession,' 203.
[50] Hamilton, *The Healers*, 162-164. While Scotland had equivalent Colleges, the domination of Edinburgh and Glasgow for medical study in the first half of the century meant a huge proportion of English-born medical graduates had Scottish degrees.
[51] Coley, 'Alfred Swaine Taylor,' 412.
[52] Ibid, 413.

toxicology, not just in England, but across Britain, was likely the largest of all his contemporaries. The textbooks outlasted the man, going through numerous editions and frequently being used as a basis for teaching by other lecturers. Taylor's reliance on Christison's work is discussed in Chapter Three, but it is worth noting here because it shows the extent to which Scottish toxicology influenced the development of English toxicology. Although the most famous, Taylor was not the only notable English toxicologist to rise to prominence during this period. William Herapath, who was Taylor's adversary in a number of trials, co-founded the Bristol Medical School in 1828, and lectured on toxicology there for four decades.[53] Thomas Nunneley was also teaching at the Leeds Medical School by 1842.[54] Out of the eight English provincial medical schools listed in the 1842 edition of the *Provincial Medical Journal's* list, all taught some variation on medical jurisprudence.[55]

The Second Half of the Century

After 1850, the relatively new security of toxicology as a subject of study was challenged by reforms within the medical profession and scientific advances. Despite its slow start, the teaching of toxicology in England had largely caught up with Scotland by the second half of the century and subsequently suffered the same decline. Reforms within the universities and medical regulation created significant changes in medical education, which appeared to cement medical jurisprudence into the curriculum. However, advances in health sciences, combined with legislation designed to improve sanitation and vaccinate against diseases, fostered the growth of public health as a subject worthy of a medical

[53] W. A. Campbell, 'William Herapath, 1796-1868: A Pioneer of Toxicology,' *Analytical Proceedings* 17, no. 9, (1980): 346.
[54] 'The Provincial Schools of the United Kingdom with the Regulation of the Principal Licensing Bodies,' *Provincial Medical Journal and Retrospect of the Medical Sciences*, 5, no. 105, (1842): 3.
[55] Ibid, 3-5.

student's time.[56] It contrasted favourably against its institutional partner, the increasingly complex, time-consuming, and arguably less practical, medical jurisprudence. Overall, the second half of the century in both countries was characterised by significantly more overlap in the trajectory of medical education, reform, and thus toxicology, with the rise of public health having a deleterious effect on the status of medical jurisprudence.

From the 1850s on, university reform and the overhaul of medical licencing created competition within British tertiary education. The 1858 *Universities (Scottish) Act* reorganised the administration of all Scottish universities with the exception of Dundee, instituting University Courts and processes for electing men to positions of power.[57] The negative report of the Royal Commission set up to investigate Oxford and Cambridge resulted in the *Oxford University Act 1854* and the *Cambridge University Act 1856*, which created new science Chairs and relaxed religious restrictions on students.[58] In 1858, the London University External Degree was established, allowing smaller universities to grant degrees and further decentralizing power from Oxford and Cambridge.[59] By 1862, all three of these universities included medical jurisprudence or forensic medicine in their medical exams.[60] In addition to the London Colleges of Physicians, Surgeons, and Apothecaries, which granted different qualifications, this meant England had eight official licensing bodies.[61] In 1861, Christison noted that some of the exclusivity of London's medical bodies

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[56] For more on the development of public health, see: Christopher Hamlin, *Public Health and Social Justice in the Age of Chadwick: Britain, 1800-1854* (Cambridge: Cambridge University Press, 1998); Anthony Wohl, *Endangered Lives: Public Health in Victorian Britain* (London: J. M. Dent and Sons, 1983).
[57] *Universities (Scotland) Act 1858.* 21 & 22, Vict., c.83.
[58] Sanderson, *The Universities*, 77.
[59] Ibid, 80.
[60] 'University of London,' *British Medical Journal* 2, no. 91, (1862): 324; 'University of Cambridge,' *British Medical Journal* 2, no. 91, (1862): 336; 'University of Durham,' *British Medical Journal* 2, no. 91, (1862): 337-8.
[61] W. E. Steavenson *The Medical Act (1858) Amendment Bill and Reform; a paper read before the Abernethian Society* (London, 1880) 30-31, Appendix A in Jeanne Peterson, *The Medical Professional in Mid-Victorian London,* 289-90. The Archbishop of Canterbury is also listed amongst licensing bodies, but as it appears that this power was rescinded and indeed seldom used, it has been omitted from this list.

had been eroded; he cites that the College of Physicians had 'long ago' opened its doors to graduates from outside the boundaries of London, and formally added forensic medicine to its requirements for accreditation.[62] Competition was not limited to the universities and licensing bodies either, as the medical schools continued to offer education to rival that of bigger institutions; for example, no English university could boast of a toxicologist as eminent as Taylor at Guy's Hospital. The increase of options for medical training in England meant prospective doctors no longer had to travel to Scotland for education, however, the loosening of practice restrictions allowed Scottish graduates greater opportunities to practice in England. These changes created competition amongst British universities, and encouraged greater exchange between the two countries.

Within these reforms, British medical education was specifically targeted by the *1858 Medical Act*, which covered England, Scotland, and some of Ireland. It created a register of qualified practitioners, instituted measures to protect the integrity of the medical profession against the common enemy of 'quacks' and, most importantly, created the Medical Council to preside over medical education and ensure that 'the persons obtaining [medical qualifications] possess the requisite knowledge and skill for the efficient exercise of their profession'.[63] This clause meant the *Medical Act* could designate which courses a medical student had to take in order to graduate, and set minimum standards for each. It also abolished apprenticeships and thus funnelled prospective apprentices into the medical schools and universities, where they received education in branches of medicine that they were unlikely to receive in apprenticeships, like medical jurisprudence.[64] Nepotism and

[62] Christison, *Graduation under the Medical and Scottish Universities Acts: with some account of the origin of universities and degrees,* (Edinburgh: Adam and Charles Black, 1861), 8.
[63] *Medical Act 1858*. 21 & 22, Vict., c.90.
[64] Loudon, *Medical Care*, 180; Newman, *The Evolution of Medical Education,* 296.

political patronage still influenced university appointments, although Crowther and White argue that political affiliations held less sway by the 1870s.[65] Despite this, in 1875, Henry Littlejohn senior complained that medical jurisprudence was 'looked upon as of comparatively little importance, and generally the youngest and least experienced lecturer is selected to discharge the duties of the chair.'[66] More importantly, he noted that the result of this perception of medical jurisprudence was detrimental to the quality of medical witnesses. He argued because courses in medical jurisprudence were solely theoretical with no practical equivalent, medical students graduated completely unprepared for their duties as witnesses.[67] Taylor also noted the scarcity of opportunities for medical men to gain practical experience.[68] This shows that medical education reforms did not necessarily benefit medical jurisprudence in Scotland or England.

Although the reforms aimed to increase the quality of medical education, they caused an outcry over the workload a medical student now had to shoulder in order to graduate. In 1864, Christison argued that 'the subjects of lecture have been multiplied too much; that the amount of lectures on many of them has become too great.'[69] Opposition to the effects of the *Medical Act* on education was prevalent in Scotland and England, which shared the same arguments about the overloading of medical students. Despite the extension of the required years of study for a degree from three to four, the rise in the number of compulsory subjects and corresponding exams to a total of thirteen at Edinburgh and fifteen at Glasgow and other universities, meant a student had less time to devote to

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[65] Crowther and White, *Soul and Conscience*, 22.
[66] Henry Duncan Littlejohn, 'On the Practice of Medical Jurisprudence,' *Edinburgh Medical Journal*, 2, 11, (1875): 100.
[67] Ibid, 97-98.
[68] Alfred Swaine Taylor, *A Manual of Medical Jurisprudence*, 10th ed. (London: J. A. Churchill, 1879): 18.
[69] Robert Christison, *Medical lectures: the faults with which they are charged and the remedy* (Edinburgh: Neill and Company, 1864), 5.

each subject.[70] Medical jurisprudence was included in the list of subjects that a candidate for a degree at any Scottish university had to sit a compulsory exam for, as well as having taken at least fifty lectures on the subject. However, this was only half the number of lectures required by the larger branches of medicine like anatomy and *materia medica*, with the requirement for these courses and approximately seven others being a minimum of one hundred lectures.[71] This pattern was repeated in English universities like Cambridge and Durham. Both stipulated that students must take a course of lectures on medical jurisprudence, which were shorter than other courses, and neither required proof of practical experience to graduate.[72] This clearly shows that medical jurisprudence was not a priority in British medical education, which is unsurprising given its increasing complexity and limited use compared to subjects more relevant to ordinary medical men. Although these changes aimed at giving medical men comprehensive education, this was to the detriment of medical jurisprudence, which hinted that the future of complex subjects like toxicology lay in developing specialized branches of medical science, separate from ordinary medical studies.

The rise of public health as a preferred subject in medical education had an adverse effect on how universities implemented medical jurisprudence. Bringing the medical professions of both countries under the same legal standards produced the same problems, and thus guided them to similar conclusions about the priority of subjects. Christopher Lawrence describes the 1860s as the period in which public health began to be seen as a

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[70] 'Medical Examining Bodies: University of Edinburgh.- University of Glasgow.- University of Aberdeen.- University of St. Andrews,' *British Medical Journal* 2, no. 91, (1862): 339.
[71] Scottish Universities Commission. *General report of the commissioners under the Universities (Scotland) Act, 1858*, (House of Commons, 1863): 16, 388-9. Some subjects differed between universities and were made up of supplementary courses.
[72] 'University of Durham,' *British Medical Journal*, 337; 'University of Cambridge,' *British Medical Journal*, 336.

'branch of government activity to be handled by medical men.'[73] Bernard Harris notes the importance of legislation in this process, like the *Public Health Act*s of 1872-5, which created sanitary authorities and expanded the numbers and powers of Medical Officers of Health (MOHs).[74] Jennifer Ward argues that the duties of forensic witnesses and MOHs were distinct, however, Taylor advised medical men in need of toxicological assistance to consult chemical analysts or MOHs, suggesting that the duties of the two roles overlapped.[75] The General Medical Council's 1862 questionnaire asked prominent medical men, including toxicologists, about the wisdom of teaching medical jurisprudence and public health together, indicating that the balance between the subjects was of institutional concern. In response to the questionnaire, Taylor claimed that it was 'impossible to combine all these sciences in one curriculum of study… With too much thrown upon a practitioner, nothing would be well done.'[76] Nevertheless, the majority of toxicologists were involved with both subjects.

The split activities of the toxicologists teaching medical jurisprudence showed that even the subject's advocates recognised the importance of public health. The reasons why and how toxicologists began challenging the necessity of teaching their subject in-depth to medical students is explored in detail in Chapter Five, but it is worth mentioning here because it was influenced by the rise of public health in education. Toxicologists, in addition to focussing on public health, recognised that the increasing complexities of toxicology

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[73] Christopher Lawrence, *Medicine in the Making of Modern Britain 1700-1920*, (London: Routledge, 1994), 61-2.
[74] Bernard Harris, *The Origins of the British Welfare State: Social Welfare in England and Wales, 1800-1945*, (Hampshire: Palgrave Macmillan, 2004), 111.
[75] Jennifer Ward, 'Origins and Development of Forensic Medicine and Forensic Science in England, 1823-1946,' (Unpublished PhD thesis, The Open University, 1993), 61; Taylor, *Manual,* 10th ed., 18.
[76] General Medical Council, 'State Medicine: resolutions of the General Medical Council, adopted July 9 and July 12, 1869; together with the second report and appendix of the Committee on State Medicine, appointed June 27, 1869,' (London: W. J. & S. Golbourn, 1869) Appendix, p.14.

made it unreasonable to expect ordinary medical men to be competent toxicologists, especially considering the increase in subjects the *1858 Medical Act* demanded of them. White discusses several Scottish medical jurists who also worked in public health, including Henry Littlejohn senior.[77] Indeed, Ward states that Taylor was the only major British toxicologist who was not involved in public health.[78] Taylor's successor Thomas Stevenson was particularly noted for his contributions to toxicology, but he was also a MOH and served as the president for the society of the same on several occasions.[79] Littlejohn senior was strongly involved in public health in Edinburgh, and his successor Maclagan, the second-to-last incumbent of the Regius Chair of Forensic Medicine and Medical Police at Edinburgh before the turn of the century, was credited with the division of the Chair into two separate courses of study.[80] It is clear that there was no lack of talent for teaching medical jurisprudence, but that by this stage its best practitioners recognised the importance of public health and the impracticality of teaching a complicated, niche subject to medical men when public health was of far more use to the general population. It also shows the importance of eminent individuals in keeping the study of medical jurisprudence alive in the universities.

Tertiary education provided other benefits relevant to future toxicology practitioners. Crowther and Marguerite Dupree discuss how networks formed between medical graduates during their studies at Scottish universities. They explain how attending a particular institution provided students with 'shared experiences [which] became a kind of

[77] White, 'Training Medical Policemen,' 156-157.
[78] Ward, 'Origins and Development,' 74.
[79] 'Obituary. Sir Thomas Stevenson, M.D., F.R.C.P.,' *British Medical Journal* 2, no. 2484, (1908): 361.
[80] 'Obituary. Sir Andrew Douglas Maclagan, M.D., F.R.C.P.E., F.R.C.S.E., LL.D. (Edinburgh and Glasgow),' *British Medical Journal* 1, no. 2050, (1900): 935.

passport,' providing groundwork for interactions later in their medical careers.[81] This extended to professors as well, demonstrated by an anecdote about students becoming acquainted with Christison through accepting lifts in his carriage.[82] The fragmentary nature of medical occupations during the nineteenth century, combined with the instability of the profession brought on by overcrowding, created conditions conducive to the creation of a large number of medical association and societies.[83] Although designed to preserve the separations within the broader medical profession, these societies had benefits similar to those of the universities. Loudon notes the 'remarkable proliferation' of these societies in the first half of the century, designed to advance and protect the interests of different factions of the medical community.[84] In gathering together groups of medical men, in whose interest it was to share information, these societies provided another avenue through which networks were developed. Ivan Waddington argues that the tripartite system of physicians, surgeons, and apothecaries did not represent strict divisions between medical men, as many practised in multiple disciplines for financial security, even belonging to multiple Colleges.[85] This shows that the potential for crossover and exchange was not limited by medical divisions to the extent that tripartite interpretations suggest.

Medical jurisprudence was a late inclusion to the nineteenth-century medical curriculum, and was only implemented on the strength of eminent toxicologists forcing the issue. The community of medical men who became toxicology practitioners emerged from a system of tertiary education that did not prioritise medical jurisprudence, and it was only

[81] Crowther and Dupree, *Medical Lives*, 94.
[82] Ibid, 91.
[83] Loudon, *Medical Care*, 208-9.
[84] Ibid, 279.
[85] Ivan Waddington, 'General Practitioners and Consultants in Early Nineteenth-Century England: The Sociology of an Intra-Professional Conflict,' in John Woodward and David Richards, eds. *Health Care and Popular Medicine in Nineteenth Century England* (London: Croom Helm Ltd, 1977), 164-168.

through the efforts of the toxicologists who promoted their subject over public health that medical practitioners had any grounding in the subject. Toxicology, as the centrepiece of most medical jurisprudence courses, was largely responsible for the disfavour medical jurisprudence fell into, as it became an increasingly delicate and complex science. Essentially, the medical education systems of Scotland and England produced competent medical men who were not necessarily competent medical jurists.

Chapter Two: Toxicology and Legal Systems

The systems of criminal investigation and law are also important to understand when considering toxicology for, just as education shaped toxicologists, so the courtroom put their skills to the test. The definition of an expert witness in both English and Scottish law was simply any person with special knowledge regarding a case such as a doctor, midwife, or toxicologist. Expert witnesses were first employed in Britain in the 1782 Folkes vs Chad civil case, which set the precedent for the calling of witnesses who had no direct link to a case because of their knowledge about a subject relevant to the trial.[86] While an ordinary witness was required to confine themselves to only facts, an expert was permitted to both provide facts and give their opinions on facts presented to them. This became problematic, as the skill levels of the so-called experts differed greatly. Additionally, Tal Golan describes how easily expert witnesses could be manipulated by lawyers, as the 'strategies for generating creditability and agreement' that the scientific community employed did not work in the courtroom.[87] Inquests and trials were where toxicology practitioners had to translate their analytical abilities into what Burney describes as a performative arena, making the complexities and uncertainties of chemical analysis simple, clear, and certain for a lay audience.[88] This chapter examines the processes of death investigation, inquests, and trials in Scotland and England, as each directly affected when medical testimony was sought, where it was used, and how it influenced the outcomes of cases. It also assesses how medical men were involved in these processes as expert witnesses, with particular attention to the influence of lawyers, legislation, and legal

[86] Tal Golan covers this trial in detail in: Tal Golan, *Laws of Men and Laws of Nature: The History of Scientific Testimony in England and America* (Harvard: Harvard University Press, 2009), 5-51.
[87] Ibid, 54.
[88] Burney, *Victorian Imagination,* 6.

changes. Despite the differences between the legal systems of Scotland and England, the courtrooms of both were dangerous places for medical witnesses. In a broader sense, law and death investigation acted as the framework in which toxicology was performed. The demands of this framework, which required far more of medical men than their education in medical jurisprudence had prepared them for, dictated how they acted when involved in poisoning cases.

Scotland, 1800-49

The legal systems of Scotland and England in the nineteenth century were distinct from one another, and served as major aspects of the national identities of each country. Scottish law had its origins in Continental systems of law. Lindsay Farmer argues that the mere fact of Scottish law being a separate system to the English 'pervades every area and every aspect of writing' about law.[89] The association of Scottish law with Scottish identity may in part explain why the influence of English law was so strongly resisted, combined with the conviction held by many that the Scottish system was better suited to its purpose than the English. The flexibility of Scottish criminal law allowed the high court and judges to exercise discretion far more than their English counterparts. The 'declaratory power' of judges to create new offences, rather than requiring pre-existing statutes in order to prosecute gave them a higher level of autonomy. Crowther describes the discretion of Scottish prosecutors as a reason why crime statistics from Scotland are difficult to compare with English statistics.[90] By the early nineteenth century, public prosecutions had become the norm, being by far the majority over private prosecutions.[91]

[89] Farmer, *Criminal Law, Tradition and Legal Order,* 21.
[90] Crowther, 'Crime, Prosecution and Mercy,' 232-5.
[91] Ibid, 225.

Riggs describes the Scottish system of criminal law as working at three levels, each with their own courts and officials. The procurator fiscals (public prosecutors) along with advocate-deputes determined which courts cases were tried in accordance with the punishment the crime warranted. At the national and highest level, crown counsel prosecuted serious cases in the High Court of Justiciary, if the crime committed merited a penalty of two years of penal servitude or above. At the county level, fiscals prosecuted moderate cases before the sheriff's 'solemn jurisdiction' (jury trial), while local officials brought minor offenders before burgh courts to be tried by the sheriff's 'summary jurisdiction' (non-jury trial).[92] Suspected poisonings resulting in death were delegated to the Justiciary Court, which had automatic jurisdiction over murder charges. The right of the accused to defence counsel was well established in the majority of Scottish courts as early as the sixteenth century, and thus Scottish lawyers were a feature of nineteenth-century trials far before their English counterparts.[93] The frequency with which law students attended medical jurisprudence lectures, mentioned in the previous chapter, indicates that Scottish lawyers were well equipped to deal with expert evidence throughout the century.

There is little literature on Scottish death investigation, with most historians of the inquest preferring to explore the English context. This could potentially be a result of the large differences between the two, where Scottish investigation was essentially a private matter, in contrast to the English public inquest. The procurator fiscal, in addition to being a public prosecutor, was the Scottish equivalent of the coroner, and was recognised as the

[92] Riggs, 'Prosecutors, Juries, Judges and Punishment,' 168.
[93] Wasser, Michael, 'Defence counsel in early modern Scotland: A study based on the High Court of Justiciary,' *The Journal of Legal History* 26, no. 2 (2005): 186.

'pursuer for criminal cases' as early as 1701.[94] The fiscal was a trained lawyer rather than a medical man, which ensured a necessary partnership between fiscals and doctors throughout the century. David Barrie and Susan Broomhall describe the procurator fiscal's process as collecting 'precognitions' (witness statements) from the witnesses in a case, and submitting them along with his report, which assessed whether there was sufficient evidence to justify prosecution, and recommended which court the case should be tried in. This process of sorting cases was essentially the equivalent of the decision-making process of the coroner's jury in England, and was influenced by the evidence, the cost of the prosecution, and the likelihood of getting a conviction.[95] In this context, the role of medical evidence was important in getting a case to trial. The fiscal was able to require medical men to act as witnesses for the Crown, thus many eminent toxicologists were called in to assist in difficult cases. Any medical man performing an examination of remains or chemical testing of such was required to submit a formal report of his findings, which was submitted as part of the fiscal's report. This report was an essential piece of evidence in subsequent trials.

Medical witnesses were primarily employed by the prosecution in the early decades of the century, which is unsurprising given that defence counsel was a luxury and medical witnesses charged fees. Scotland had a ready supply of expert witnesses, in the form of Christison and other lecturers of medical jurisprudence. Crowther argues that the Scottish corroborative evidence requirement supported the rise of toxicologists in court, because it meant at least two expert witnesses were required in every case.[96] This created demand for

[94] Susan R. Moody and Jacqueline Tombs, *Prosecution in the Public Interest* (Edinburgh: Scottish Academic Press, 1982), 18.
[95] David Barrie and Susan Broomhall, *Police Courts in Nineteenth-Century Scotland, Volume 1* (Surrey: Ashgate, 1988), 231.
[96] Crowther, 'The Toxicology of Robert Christison,' 137.

expert witnesses and theoretically ensured the quality of testimony. The *Jury Trials (Scotland) Act 1815* allowed the courts to compel the attendance of witnesses long before the *Attendance of Witnesses Act 1854*, although the latter covered the subject more comprehensively and applied to the whole United Kingdom.[97] In court, the medical witness had to present his report, which was admitted as a piece of evidence in itself, and answer questions put to him by each side. Additionally, while medical witnesses were permitted to attend the presentation of chemical and scientific facts and findings, they were required to leave when one of their number gave their opinion on any of the facts presented. This rule was applied inconsistently, and Christison argued that it was a system 'liable to several inconveniences' but it was an important differentiation between expert testimony in Scotland and England.[98]

England, 1800-49

English law at the beginning of the century was complicated and convoluted, partly due to the overlapping dual structure of codified and common law. David Bentley notes several failed attempts to reform and simplify these laws and procedures.[99] England did not have a system of public prosecutors like Scotland and Ireland. Instead, a piecemeal system of private prosecutions, combined with an increasing tendency for judges to employ counsel to prosecute offenders, served the country throughout the century.[100] Bentley describes the division of offences into indictable and summary offences, under which indictable offences were again divided into treasons, felonies, and misdemeanours. These divisions decreed

[97] *Jury Trials (Scotland) Act 1815*, 55, Geo. 3, c.42, *Attendance of Witnesses Act 1854*, 17 & 18, Vict., c.34.
[98] Robert Christison, 'Account of the Medical Evidence in the Case of Mrs Smith, tried at Edinburgh in February last for Murder by Poison; -With Notes and Commentaries.,' *Edinburgh Medical and Surgical Journal*, 27, no. 90, (1827): 466.
[99] Bentley, *English Criminal Justice,* 1.
[100] Ibid, 83-7.

where and how a crime was tried. Indictable offences, including charges of murder and manslaughter resulting from inquests, were tried in the Assizes or the Old Bailey, which had jurisdiction over all capital charges.[101] The verdict of a coroner's jury bypassed the grand jury system and sent cases straight to trial.[102]

The English system of death investigation began with the coroner, who faced numerous obstacles in the attempt to carry out his duty. Like fiscals, coroners were usually lawyers, and this remained the case throughout the century after the campaign of medical reformer and editor of *The Lancet* Thomas Wakley to introduce medically-trained coroners in the 1830s was unsuccessful.[103] This meant that from the very start the coroner, like the fiscal, was effectively hamstrung by his own skillset; while he might be able to make judgements on cases where the cause of death was clear, such as, deaths due to wounding, cases of concealed murder like poisoning were likely to escape his notice altogether. Additionally, Thomas Forbes explains that payment for an investigation was awarded only if the culprit was convicted, which meant that deaths that were not clearly suspicious, or without a possibility of an arrest, were often not investigated.[104] Justices of the Peace also maintained authority over the coroners, as fees could be withheld at their discretion, if an inquest was deemed unnecessary. This had a flow on effect for medical witnesses, who often struggled to get recompense for their witnessing services. Despite the importance of inquests, there was seldom provision for courts or even morgues. Even by 1800, autopsies were common preliminaries to inquests, although the skill with which these were carried

[101] Ibid, 8.
[102] Clive Emsley, Tim Hitchcock, Robert Shoemaker, 'Crime and Justice- Trial Procedures,' *Old Bailey Proceedings Online*. Accessed 21 May 2016, www.oldbaileyonline.org/static/Trial-procedures.jsp
[103] Thomas Forbes, 'Crowner's Quest,' Transactions of the American Philosophical Society, 68, 1, (1978): 43-44.
[104] Forbes, *Surgeons at the Bailey,* 11.

out varied greatly, as did the conditions they were carried out under.[105] Bodies were held and viewed in a number of places, including pubs, which were often unsanitary and not conducive to the preservation of remains.[106] As in Scotland, the medical witness was a key part of the process of death investigation. Coroners, like fiscals, were able to summon or subpoena medical men to act as witnesses. Watson notes that it was generally the doctor of the deceased or simply the medical man nearest to hand.[107] In cases where the cause of death was unclear or required a different set of skills, other medical witnesses were consulted, particularly in cases of poisoning. Unlike in Scotland, medical witnesses in an English court did not have to supply formal reports, instead, giving their evidence in solely verbal form. This was problematic for witnesses, especially if inquests and particularly trials were not held for some time after a suspicious death occurred.

In 1836, two pieces of legislation were enacted that altered the English courtroom and how expert witnesses were brought to and treated in court. Defence lawyers began to emerge in the English courtroom in the seventeenth century, and even from the beginning it was clear that a skilled lawyer could make a mockery of an unprepared witness. The *Prisoner's Counsel Act (1836)* gave the defendant the right to legal representation, and more specifically to have their case presented and conducted by a lawyer, rather than having to do cross-examinations themselves.[108] The *Medical Witnesses Act* provided for the retention of a medical witness, and allowed the jury to request a second opinion from another medical man, and a second autopsy if required. In terms of toxicology, the chemical

[105] Bentley, *English Criminal Justice*, 8.
[106] Elizabeth T. Hurren, 'Remaking the Medico-Legal Scene: A Social History of the Late-Victorian Coroner in Oxford,' *Journal of the History of Medicine and Allied Sciences* 65, no. 2, (2010): 239.
[107] Watson, 'Medical and Chemical Expertise,' 379-380.
[108] J. M. Beattie, 'Scales of Justice: Defense Counsel and the English Criminal Trial in the Eighteenth and Nineteenth Centuries,' *Law and History Review*, 9, 2, (1991): 251-2.

analyses it paid for were limited, and the greater the reputation of the toxicologist, the higher their fees were.[109] Taylor complained of the *Medical Witnesses Act* several times, in 1837 arguing that it was 'an instance of defective legislation which must often press particularly hard upon members of the [medical] profession,' as fees were often denied to medical witnesses.[110] Additionally, in 1856 he noted that the Act 'limits the analysis to the *contents* of the stomach or intestines,' which did not account for the other organs and matter that needed to be tested, nor the requisite time, skill, and money, necessary to perform such tests.[111]

The Second Half of the Century

There has been even less written on death investigation and law in the second half of the century than on the first, especially for Scotland. Although criminal law evolved over the second half of the century, few law changes affected expert testimony in both countries. This enabled toxicologists to consolidate their positions, making the use of experts, rather than ordinary medical men, as witnesses the norm. Crowther argues that the systems of death investigation and prosecution in nineteenth-century Scotland and England began to achieve a kind of consistency, despite entirely distinct systems.[112] By the middle of the century, the court system began to adapt to the new contingents of medical witnesses and lawyers regularly involved in courtroom proceedings, and the latter became increasingly adept at manipulating the evidence of the former. In the same line, with the increase in expert witnesses available, it became more common for the scientific evidence itself to be

[109] Watson, 'Medical and Chemical Expertise,' 380, 387.
[110] Alfred Swaine Taylor, 'Remuneration of Medical Witnesses,' *London Medical Gazette*, 19, (1836-37): 268.
[111] Alfred Swaine Taylor 'On Poisoning by Tartarized Antimony, with Medico-Legal Observations on the Cases of Ann Palmer and others.,' *Guy's Hospital Reports*, series 3, 3, (1857): 432. Italics in original.
[112] Crowther, 'Crime, Prosecution and Mercy,' 238.

questioned through the experts hired by the defence. This placed more pressure on medical witnesses, who had to contend with lawyers and opposing experts.

There were a number of contentious poisoning trials in the 1850s, but it is particularly worth noting that of William Palmer in 1856. This trial, while not strictly relevant to the evolution of law, is important because of the precedent it set for the use of expert witnesses within British courtrooms. Palmer was an English doctor accused of poisoning three people, and his trial was the first example of medical witnesses being employed *en masse* by both the prosecution and defence. Alison Adam puts the number of medical witnesses called at thirty-nine, a total that included Christison, Taylor, William Brande, Henry Letheby, and William Herapath, amongst others.[113] Palmer was convicted and hanged, and while his moral guilt was undoubted, the evidence that convicted him was considered less than satisfactory. The consequences of the trial for toxicology were legion and have been thoroughly explored by historians.[114] However, considering the legal system specifically, the trial not only set the precedent for successfully challenging medical evidence, which had seldom been done in the past, but proved that even the evidence of the greatest toxicologists of the day could be challenged by a competent counsel armed with opposing experts to cloud the evidence. This translated into practice in trials across the country later in the century, including those of Smethurst, Maybrick, and Bartlett.

[113] Alison Adam, *A History of Forensic Science: British Beginnings in the Twentieth Century* (Abingdon: Routledge, 2016), 29.

[114] The evidence was controversial largely because of the large-scale witness conflict, which created the impression that medical testimony was untrustworthy. Taylor's inability to definitively detect the poison used threw doubt on the prosecution's argument. See Burney, *Victorian Imagination,* 116-151, for the most comprehensive assessment. Other historians have used the trial as a case study, including: Golan, *Laws of Men*, 97-100; Watson, *Forensic Medicine,* 66-67.

It is worth briefly noting legislative changes regarding poisoning, although examining them in depth is beyond the scope of this chapter. After 1850, the Sale of Arsenic Regulation Act was introduced to attempt to control the sale of arsenic, as it was the poison most commonly used for murder.[115] It was designed to prevent potential poisoners from attaining their murder weapons, however, as Peter Bartrip notes, the efficacy of these measures was dubious, and it was not solely responsible for changing crime patterns.[116] Additionally, while these may have affected crime, they were less influential on expert witnesses.

Scotland, 1850-99

The Scottish legal system, like the English system, evolved over the century; however, few of the changes greatly influenced the use or position of medical witnesses. Although minor clarifications and rearrangements in jurisdictions and procedure occurred in Scottish law in the second half of the century, the court system remained largely the same. Where the English solely used statutes to prosecute all crimes, the Scottish still tended to prosecute under their own common law even when statutes had been instituted to deal with particular crimes. Some convergence of practice did occur, but this was more likely about public opinion than concerted effort; for example, Crowther notes the tendency of both Scottish and English courts to retreat from capital punishment over the century, even when their laws did not necessarily require this.[117] Certain criminal law-related acts were passed that encouraged this convergence, like the *Attendance of Witnesses Act*, but the majority of legislation passed was still either applicable to either England and Wales, or Scotland, rather than both England and Scotland. Following the trend across Britain, lawyers

[115] *Sale of Arsenic Regulation Act 1851*, 14 & 15, Vict., c.13.
[116] Peter Bartrip, 'A "pennurth of arsenic for rat poison": the Arsenic Act, 1851 and the prevention of secret poisoning,' *Medical History* 36, no. 1, (1992): 59-68.
[117] Crowther, 'Crime, Prosecution and Mercy,' 230.

were becoming a part of criminal proceedings more frequently. In 1856, medical jurisprudence training became a requirement for lawyers wishing to join the Edinburgh Faculty of Advocates, which ensured that more lawyers were versed in the medical testimony they would have to question in court.[118]

Death investigation did not undergo any significant changes either, rather it became more formalised and regulated. Crowther notes that fixed salaries became a common solution to the problem of underfunded fiscals by the middle of the century.[119] This allowed for more consistent prosecutions, which in the past was limited by the fiscal's funds and had resulted in weak, uncertain, and minor cases escaping prosecution. The flow-on effect of this was the increased employment of expert witnesses. Barrie explains that even after the establishment of police forces in Scotland, the fiscal was still responsible for death investigation. In practice however, the fiscal delegated duties to police officers, a procedure which spread to the English counties.[120] Evidence of this is clearer in the second half of the century, although it is likely that it began earlier, especially given the early development of police forces in Scotland. Kit Carson and Hilary Idzikowska argue that monetary issues encouraged the involvement of police forces in criminal justice, noting the financial benefits of having police to take precognitions as one example.[121] This showed the increasing professionalization of death investigation, as medical men became part of a chain of men responsible for criminal inquiries.

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[118] White, 'Training Medical Policemen,' 153.
[119] Crowther, 'Crime, Prosecution and Mercy,' 234-235.
[120] David G. Barrie, 'Anglicization and Autonomy: Scottish Policing, Governance and the State, 1833 to 1885,' *Law and History Review* 30, no. 2, (2012): 472.
[121] Kit Carson and Hilary Idzikowska, 'The Social Production of Scottish Policing 1795-1900,' in Douglas Hay and Francis Snyder eds. *Policing and Prosecution in Britain 1750-1850*, (Oxford: Clarendon Press, 1989), 291.

In court, toxicologists became firmly established as expert witnesses, and for the most eminent individuals, the nature of the formal reports they submitted began to change. Crowther explains that Christison's reports became shorter and less detailed, as his reputation became established and his work less likely to be questioned.[122] This links to the idea that toxicology in Britain had grown to be self-reliant on the backs of its experts, a phenomenon discussed in detail in Chapter Three. Despite this, eminent medical men still presented numerous reports to cover all their assorted processes and tests. For example, in the trial of the infamous Dr Pritchard in 1865, the prosecution witnesses Littlejohn senior and Maclagan lodged eight separate medical reports as evidence, four of which concerned the post-mortems, while the other four covered the chemical analyses.[123] The effect of the previously mentioned corroborative evidence requirement of Scottish law is clear here. It kept multiple experts employed in every instance where medical evidence was necessary, and potentially had some influence in preserving the small pool of Scottish toxicologists in the face of the decline of medical jurisprudence in universities. This illustrates the trend in regulation and consolidation of small, specialist groups that was the hallmark of professionalization in the nineteenth century.

England, 1850-99

As in Scotland, change was not drastic in English death investigation in the second half of the century. Mirroring the increasing financial security of the Scottish fiscals, in 1860, the *County Coroners Act* provided a salary for coroners, which allowed them to instigate inquests without needing the financial backing of Justices of the Peace.[124] This likely

[122] Crowther, 'The Toxicology of Robert Christison,' 138.
[123] William Roughead ed., *Trial of Dr. Pritchard* (Edinburgh: William Hodge and Company, 1906), 51-2.
[124] Forbes, *Surgeons at the Bailey*, 14.

contributed to the rise in the overall number of inquests by the latter half of the century, which created higher demand for expert testimony. Inquests were still routinely held in pubs, and even after the *Public Health Act 1875* allowed for the construction of new mortuaries and coroners' courts, this did not always equate to material changes, especially in provincial areas.[125] While this was far more likely to affect local medical witnesses than the experts, it is still worth noting the effect poor facilities likely had on any investigations under such conditions. By 1850, the police and other officials were more consistently undertaking publicly funded prosecutions, and working subordinately to coroners in death investigation.[126] In 1856, police forces became mandatory across England under the *County and Borough Police Act*, thus making it more likely that the necessary information to begin an inquest would reach the coroner through the authorities rather than the general population.[127] The pattern of formalising death investigation mentioned in the Scottish case is also clear here. Despite this, as late as 1879, Taylor complained about the 'inadequacy of the coroner's inquest to detect a crime or the perpetrator of a crime.'[128]

Legislation in the second half of the century did not seriously affect expert witnesses either. The *Medical Witnesses Act* had long been considered inadequate, especially in its definition of all medical witnesses as equally competent. By 1895, London's Public Control Committee was making recommendations in line with these earlier criticisms, with a report suggesting a collection of specialists should be attached to each coroner's court, to perform autopsies and deal with other aspects of medical investigation.[129] This was reminiscent of

[125] Burney, *Bodies of Evidence*, 83-7.
[126] Bentley, *English Criminal Justice*, 7.
[127] Haia Shpayer-Makov, *The Ascent of the Detective: Police Sleuths in Victorian and Edwardian England* (Oxford: Oxford University Press, 2011), 41, 47.
[128] Taylor, *Manual,* 10th ed., 132.
[129] Burney, *Bodies of Evidence*, 123.

Wakley's campaign to institute medical coroners back in the 1830s. However, these reforms did not translate into practice, and by the turn of the century, the project had been scuppered by the angry reaction to the poorly implemented reforms. Additionally, Burney notes that proposals to create court-appointed toxicologists were unsuccessful, due to fears that it would negatively affect the adversarial nature of English law.[130]

As in Scotland, the pool of English expert witnesses decreased as the century went on, due to developments in education and public health, rather than law. The increase in the employment of Home Office Analysts in criminal cases over regional or conveniently situated experts was due to the changes in medical education. [131] The consolidation of a select group of experts to act in lieu of a broader pool of medical men with varied levels of skill altered the composition of expert evidence in the courtroom, particularly for the prosecution, which had access to the Crown retained experts. The contrast between this and the expert battles of the 1850s is striking, and indicates how developments outside the courtroom affected what happened inside. Within the courtroom, this equated to a tangible shift towards standardisation of practice across England and Scotland, as the professionalization of toxicology created similar situations for expert witnesses in both countries.

Despite having distinct legal systems, the Scottish and English judiciaries held similar ideas about the place of expert testimony in law. In both countries, the lack of medical training of death investigators made medical men an important part of death investigation. The assumption that all medical men were competent meant specialist training was not

[130] Burney, *Victorian imagination*, 173.
[131] Watson, 'Medical and Chemical Expertise,' 390.

required. Additionally, as the previous chapter demonstrated, medical jurisprudence was not a priority in the medical curriculum, and graduates usually lacked practical experience. The entrenchment of medical testimony in both legal systems is an interesting contrast to the slow decline of medical jurisprudence in tertiary education. The law demanded more of medical men, while tertiary education demanded less, making it more important for expert witnesses, like Christison, Taylor, and their contemporaries, to be involved in trials. The corroborative evidence requirement of Scottish law legitimised the informal interactions between practitioners that the difficulties of toxicology created. In terms of expert testimony, the law did not change drastically, but did improve funding for and regulation of death investigation, thus consolidating the place of the expert witness in court. Medical witnesses had to contest with the difficulties of performing in a court of law, and, increasingly, with hostile lawyers. The challenging environment medical witnesses faced in courtrooms, combined with their rudimentary education in medical jurisprudence, created the conditions for toxicologists to establish themselves as experts, and for medical men to interact with these experts, and one another.

Chapter Three: Authority, the Continent, and British beginnings

It is clear that the development of toxicology in Scotland and England took place in very different contexts, which must be kept in mind when examining the toxicological community directly. Education and law throughout the century acted as frameworks in which toxicology evolved, and show the challenges early toxicologists faced when building their profession. As shown, during the first half of the century, toxicology was a little-known science, which toxicologists like Christison and Taylor sought to turn into a profession. The process of turning toxicology into a professional and respectable science relied upon the first toxicologists becoming experts and legitimising toxicology in the eyes of the medical fraternity and the law. This necessarily took place in the first half of the century, as it was during the foundational decades of the science that the creation of authority and establishment of expertise took place. This chapter examines the methods by which Christison and Taylor established their authority in individual cases during this period, and what this reveals about how toxicologists defined authority.

This occurred through two different avenues. Firstly, British toxicologists had to establish themselves as independent of the much further advanced toxicological professions of France and Germany. Initially, Continental research served as the common body of knowledge that Scottish and English toxicologists used to support their arguments and thus claim expertise. However, in order to make British toxicology an expert profession in its own right, toxicologists like Christison and Taylor moved away from reliance on foreign authorities, and, through doing their own original research, utilized Continental knowledge as complementary to their own. The early development of Scottish toxicology made this process particularly relevant to Christison, but it applied to later toxicologists like Taylor in

terms of not only Continental toxicology but also Scottish advances. Secondly, Christison and Taylor constituted themselves as separate from the bulk of medical witnesses, as an expert class. In their writings to and about ordinary practitioners, it is clear that both men had similar perceptions of the relationship between these practitioners and themselves as experts. They used their knowledge and experience to dictate the boundaries of the expert class, determining who was classed as an expert and who was not. The similar ways Christison and Taylor defined themselves as experts shaped the development of toxicology in Scotland and England, by both setting a new bar for expertise and determining the pattern for future interactions between experts and ordinary practitioners.

Defining Toxicological Authority

Historians regard the nineteenth century as a key period for professionalization of the sciences and medicine. However, they often contend that modern concepts of professionalization do not correlate with Victorian views of what constituted professionals. Shortt argues that the historian's definition of professionalization is best left 'deliberately vague', in order to account for differences in perception.[132] Heather Ellis, for example, argues that personal character and popular ideals were just as important in the perception of professionals as their actual expertise.[133] This applies to toxicology in that the courtroom performances of medical men were hugely influential in how they were publicly perceived. Crowther and White note that Henry Rainy, Glasgow's accomplished professor of medical jurisprudence, was seldom called as an expert witness because of his 'difficult

[132] S. E. D. Shortt, 'Physicians, Science, and Status: Issues in the Professionalization of Anglo-American Medicine in the Nineteenth Century,' *Medical History* 27 (1983): 52.
[133] Heather Ellis, 'Knowledge, character and professionalisation in nineteenth-century British science,' *History of Education* 43, no. 6, (2014): 781.

temperament,' which made it hard for lawyers to portray him as a reliable expert.[134] Equally important for toxicologists was how they constructed their positions in relation to knowledge, ordinary medical men, and each other.

As noted in the introduction, Burney's theory regarding the two 'professional constituencies' of toxicology is particularly important when looking at the construction of authority. He divides practitioners of toxicology into two tiers: 'first, ordinary practitioners, mainly local surgeons and apothecaries, who conducted post-mortems and chemical analyses in the bulk of suspected poisoning cases; and second, experts like Christison and Taylor, who represented toxicology in cases of 'special difficulty'.[135] The power dynamic that existed between the tiers of practitioners influenced how knowledge passed within and between medical men. This makes the exchanges between the few experts and the many ordinary practitioners particularly telling. In utilizing this idea of tiers in order to understand the toxicological community, it is important to understand the practical constituencies of these different levels. While medical men had appeared as expert witnesses since the late eighteenth century, in terms of toxicology as a profession, the men who could truly claim expertise were slow to emerge and small in number for the first half of the century. Therefore, discussing the upper tier of practitioners in the decades prior to 1850 is to speak of a few men at the beginnings of their careers. By extension, to speak of the lower tier is to speak of all the practitioners who had to perform toxicological testing without the benefit of true expertise, who were doing so before and after the emergence of the upper tier. As discussed in the introduction, these practitioners included physicians, apothecaries, chemists, and general practitioners, only the later generations of whom had received the

[134] Crowther and White, *Soul and Conscience*, 18.
[135] Burney, *Victorian Imagination*, 44-5.

benefit of training in medical jurisprudence. While some of these practitioners may have had reasonable experience, it could not equate to expertise.

The way individuals cultivated expertise relates directly to how experts shaped the development of toxicology. As noted in Chapter Two, because the law made no allowance for different skill and experience levels of expert witnesses, the expertise of these witnesses on any given subject varied greatly. Thomas Gieryn discusses how different categories of people involved in a science set the parameters for credibility and thus expertise. He describes these people as falling into three main groups: the practitioners who claim expertise within a science, the practitioners who rely upon that expertise, and the lay people who are affected by the science in their everyday lives.[136] The expectations of each of these groups of people define how authority is created, as those claiming authority must cater to the different sets of expectations and demands of each group to have their claims to authority recognised as legitimate. Brian Wynne argues that 'Scientific knowledge is established, assimilated, and transmitted by social trust and authority,' which is created through the meeting of audience expectations.[137] For toxicology, in a court of law, the audience consisted of lay people, lawyers, and occasionally other expert witnesses, all of whom had specific expectations of expert evidence, and it was these expectations that the expert witness had to meet if their evidence was to be considered sound. Each of the groups of people made different demands on toxicologists, but to consider all of them is outside the scope of this work. Instead, this chapter will focus on how toxicologists like Christison

[136] Thomas Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999), 21-22.
[137] Brian Wynne, 'Establishing the rules of law: constructing expert authority,' in *Interpreting Science in the Law: Expert Evidence*, eds. Roger Smith and Brian Wynne, (London: Routledge, 1989), 34.

and Taylor attempted to prove to other medical men that they were the experts in their field.

Early Developments in Toxicology

It is important to discuss the state of toxicology in Britain and on the Continent in the early nineteenth century, because the contrast between them shows why toxicologists constructed themselves as separate to all other practitioners. The influence of France and Germany on British toxicology was considerable, as not only did the profession in both countries pre-date the British profession, but advances in toxicological testing were overwhelmingly French and German. France, in particular, stood out, largely due to Mateu Orfila, the 'father of toxicology.' His influence on British toxicology in the early decades of its development was significant, because his status as the uppermost authority on toxicology made him a favourite authority to cite by toxicologists.[138] Orfila and other notable medical men, including François Magendie, Joseph Gay-Lussac, and Pierre-Jean Robiquet, made Germany and, especially, France, training grounds for future British toxicologists. A large proportion of the medical men who became toxicologists received training in these countries, including Christison, Taylor, and Littlejohn, where they learned from and formed personal connections with prominent chemists and toxicologists.[139] Although preliminary training abroad was an early avenue through which British toxicologists began to make intellectual connections, it was not the only one. The collection of works Continental toxicologists had amassed served as the body of knowledge that British toxicologists cited to claim credibility. The common practice of British medical periodicals of publishing material

[138] For details of Orfila's work, see: Jose Ramon Bertomeu-Sanchez, 'Popularizing Controversial Science: A Popular Treatise on Poisons by Mateu Orfila (1818),' *Medical History* 53, (2009): 351-378.
[139] Christison, *The Life of Sir Robert*, 1, 224-245; Coley, 'Alfred Swaine Taylor,' 412-413; Kaufman, 'Origin of the Regius Chair,' 126.

from other British and foreign journals ensured regular updates on medical and scientific advancements from beyond Britain's borders. Major medical journals, such as *The Lancet*, the *EMSJ* and the *London Medical Gazette (LMG)*, all consistently published excerpts from foreign journals, including some authored by the most influential figures in chemistry and toxicology. For example, Orfila was mentioned in the first editions of both *The Lancet* and the *LMG,* regarding his work in medical jurisprudence.[140] Reviews of toxicological textbooks and reports on foreign discoveries were also common.[141] Mentions of toxicology overall became increasingly frequent in medical journals over the decades, especially as British toxicologists and chemists began to publish on the subject. The journals, in conveying this foreign content to a wide medical and scientific readership, were essential in supporting the links between toxicology on the Continent and in Britain.

The slow development of toxicology in Britain and the skills of its early experts provide a stark contrast. The trial of Mary Blandy for the murder of her father in 1792 is regarded by many historians as initiating the development of toxicology as a science in Britain. Watson describes the trial as being the first instance where 'convincing' toxicological evidence was accepted within a court of law.[142] Blandy was convicted of murdering her father as part of a conspiracy with her lover, who had convinced her to give her father a 'powder' to induce him to let the pair marry. The evidence regarding the arsenic was rudimentary; with the identification of the poison being established through the alliaceous (garlicky) scent produced when a small amount was burned. This scent test, which sealed

[140] 'Methods of Detecting Spots of Blood,' *London Medical Gazette*, 1, (1827-8): 355-356; T. Alcock, 'On the immediate Treatment of Persons poisoned,' *The Lancet*, 3rd ed., 1, (1823-4): 286-7.
[141] E.g. 'Médicine légale, théorique et pratique. Par Alph. Devergie, D.M.P., Professeur Agrégé,' *London Medical Gazette*, 17, 1835-6, 351-3; 'On Poisoning by Arsenic. Orfila's Late Discoveries,' *London Medical Gazette*, n.s., 2, (1838-9): 939-42. These are just two of many examples.
[142] Watson, *Poisoned Lives,* 3.

Blandy's fate, was one of the very basic, far from reliable, tests for arsenic that were available to practitioners in the late eighteenth and early nineteenth centuries. The extremely contentious conviction and execution of Eliza Fenning in 1815 rested on similarly poor toxicological evidence, reminding the British public of the poor state of expertise in poisoning cases.[143]

Arsenic was one of the most prevalently used poisons in Victorian Britain, and because it was a common choice, tests for it were in demand. The development of the precipitate tests in the first decade of the century was an important step towards testing with any degree of accuracy. Robert Goldsmith describes the three most common precipitate tests, which relied far more on chemical processes than previous methods.[144] However, they were still reliant on the sensory perceptions of the practitioner, which were difficult to quantify, as they produced specific colours that confirmed the presence or absence of arsenic. The hugely varying descriptions of shades of colours are evident in court records.[145] Christison endorsed only one of these tests, as the presence of vegetable and animal matter was liable to affect the results of the others.[146] Reduction tests were an alternative method, which were designed to reduce the arsenic in a sample to its elemental state and thus make it visible. It was not until 1836 that the first of the tests that became staples of nineteenth-century toxicology was developed. The creation of the Marsh test revolutionised toxicological testing, allowing for unprecedented accuracy and sensitivity in

[143] For accounts of the Fenning case, see: Vic Gatrell, The Hanging Tree: Execution and the English People 1770-1886 (Oxford: Oxford University Press, 1994), 353-366; 'ELIZA FENNING, Breaking Peace > wounding, 5th April 1815,' Old Bailey Online, accessed 17 January 2017. https://www.oldbaileyonline.org/browse.jsp?div=t18150405-18.
[144] Robert Goldsmith, 'The Search for Arsenic,' in *More Chemistry and Crime: From Marsh Arsenic Test to DNA Profile*, eds. S. Gerber and R. Saferstein, (Washington DC: American Chemical Society, 1997), 154-6.
[145] Ian Burney, 'Bones of Contention,' 247.
[146] Ibid, 247.

the detection of arsenic.[147] This was followed by the Reinsch test in 1842, which was simpler but also less sensitive. These tests dominated toxicology for the rest of the century, although they were repeatedly modified. Goldsmith lists seven permutations of the Marsh test alone, omitting a number of others.[148]

Scottish Expertise.

The emergence of Scottish expert toxicologists began with Christison in 1822. Subsequently, these experts coalesced into a class, separate from ordinary practitioners. The fact that Christison had no Scottish or even British predecessor of his skill level meant that the body of knowledge he drew from was necessarily foreign. Chapter One discussed the establishment of a pool of academic medical witnesses with the creation of many new university posts in medical jurisprudence. However, other toxicologists of Christison's calibre only emerged in the second half of the century, including Henry Duncan Littlejohn and Andrew Douglas Maclagan. This meant Christison was the most dominant figure in toxicology for the around three decades, giving him strong influence over the profession's development.

Before the emergence of these other experts, Christison was faced with the task of establishing himself as a toxicologist on his own. Crowther has assessed the relationship between Christison and Orfila in the context of Christison's emerging career, describing his association with Orfila as 'an essential prop to Christison in demonstrating the new respectability and modernity of toxicology.'[149] In the early stages of Christison's career, he

[147] For examinations of the invention and consequences of the Marsh test see Katherine Watson, 'Criminal Poisoning in England and the Origins of the Marsh Test for Arsenic,' in *Chemistry, Medicine, and Crime*, 183-206; José Ramón Bertomeu-Sánchez, 'Sense and Sensitivity: Mateu Orfila, the Marsh Test and the Lafarge Affair,' in *Chemistry, Medicine, and Crime,* 207-243.
[148] Goldsmith, 'The Search for Arsenic,' 157.
[149] Crowther, 'The Toxicology of Robert Christison,' 130.

was identified with Orfila by both the public and professional institutions, which initially gave his position as an expert toxicologist legitimacy. He received Orfila's endorsement when he applied for the Chair of Materia Medica at Edinburgh, and Crowther notes their names were associated in court as well.[150] Despite the benefits this association bestowed, for Christison to make toxicology an independent profession, he needed to make it clear that he was not reliant on foreign authorities, as he was an authority himself.

In his autobiography, Christison described this process of becoming an expert in his own right. The poor state of medical jurisprudence in early nineteenth-century Britain led Christison to rely heavily on French and German research. He listed the few resources available to him when he first began preparing for lecturing in medical jurisprudence as a few 'meagre' French treatises, an 'assortment of straggling cases' from British medical journals, and trial records. He used French toxicology as a model to work from, as it was 'at that time far ahead of us,' and shortly mastered the German language in order to be able to include German discoveries in his lectures.[151] He eventually built up his own medico-legal knowledge through 'constant practice as a reporter in precognitions [witness statements] and as a witness in courts of law.'[152] This did not cause Christison to stop using Continental research, as he was a strong advocate of amalgamating many different sources to draw the strongest conclusions. Instead, his own research allowed him to use Continental research as complementary to his own knowledge, shifting away from total reliance. Additionally, Crowther discusses how his position as co-editor of the *EMSJ* from 1820 put him in a position to review the work of other toxicologists and contribute his own ideas on their

[150] Ibid, 126, 130.
[151] Christison, *The Life of Sir Robert,* 1, 281.
[152] Ibid, 282.

findings, which gave him authority early in his career.[153] The medical journals provide several other examples of Christison establishing his place as expert witness, using both foreign knowledge and increasingly his own to do this.

The case of Mary Smith is one of the lesser-known poisoning trials of the nineteenth century, but is valuable because it sparked a heated exchange between Christison and John Mackintosh, a Lecturer of Physic and Midwifery, in the *EMSJ.* Crowther has described the case as one that helped build Christison's reputation as an expert witness.[154] In February 1827, Smith was indicted for the murder of her servant Margaret Warden. She was alleged to have administered arsenic to Warden on the suspicion that the servant had fallen pregnant to Smith's son. Rumours amongst the Dundee community led to an exhumation of Warden's body by three local doctors, including Mackintosh. They used the standard precipitate and reduction tests to establish the presence of arsenic, and subsequently applied to Christison for a second opinion. Although Christison confirmed the presence of the poison in the servant's remains, it was his subsequent remarks on the quality of the other medical witnesses that caused the rift. The resulting exchange of views between Christison and Mackintosh is particularly illuminating, as it highlights the difficulties involved in negotiating the place of the newly established expert toxicologist in the courtroom, and engaging with other practitioners of the lower tier of expertise.

Volume 27of the *EMSJ* contained Christison's initial remarks, which consisted of verbatim medical evidence with many extra comments of his own. In these comments, Christison criticised several of the doctors he testified with, contesting their evidence in

[153] Crowther, 'The Toxicology of Robert Christison,' 131.
[154] Ibid, 135-6.

several areas. For example, while the three 'Dundee doctors' performed seven separate tests for arsenic, Christison asserted that two of them were in fact tests for other poisons while another two were liable to give false positives for other substances.[155] Christison cited Orfila in court, making sure to point out that Orfila was 'one of the highest authorities in Toxicology'.[156] Mackintosh retaliated quickly, and in the next edition of the *EMSJ* he countered the points made against him in detail and, like Christison, invoked Orfila to prove his points.[157] It became clear that a significant part of Mackintosh's anger was directed at the way Christison used his status as an authority to discredit and supersede the other witnesses:

> And, whatever respect I may entertain for Professor Christison's talents, scientific acquirements, and tact in performing chemical experiments, I cannot help stating my conviction, that practical experience acquired at the bedside is of far greater consequence in a case of this nature, in directing judges and juries, than the kind of knowledge which is obtained by reading, even when united with great dexterity in conducting chemical analysis. There never was a case which afforded better proof of this position. The medical gentlemen of Dundee, whose conduct on this occasion is above all praise, detected arsenic just as decidedly as Professor Christison, although they stated in court that they had never performed the like experiments before. I cannot help adding, that Professor Christison appears to me to have presumed too much upon his office, and seems to forget what is due to practical men.[158]

[155] Robert Christison, 'Account of the Medical Evidence,' 467.
[156] Ibid, 460.
[157] John Mackintosh, 'Reply to Professor Christison's criticism in the Edinburgh Medical and Surgical Journal for April 1827, on Dr Mackintosh's Evidence in the Case of Mrs Smith, tried for Poisoning before the High Court of Justiciary,' *Edinburgh Medical and Surgical Journal*, 28, no. 92, (1827): 85.
[158] Ibid, 86.

Mackintosh's attitude exemplified the tension between the tiers of experts at its strongest. His resentment stemmed from what he perceived as the slight against the ordinary practitioners, made by a 'young professor' who suffered from 'his want of a sufficient knowledge of the world, and etiquette', although he clearly did recognise that Christison's skills qualified him as an expert.[159] Despite having taught in medical jurisprudence, when placed in a courtroom situation with Christison on a matter of toxicology, Mackintosh was essentially reduced to the level of the local doctors in the eyes of the court and the profession.

The exchange terminated with Christison's rebuttal of Mackintosh's claims, in which he reiterated his expert status. He attacked Mackintosh's assertion that general practitioners without real experience of poison analysis were better qualified to testify than he was, noting an error of Mackintosh's as showing 'the danger of trusting to general questions and answers… where the line of distinction between general knowledge and *personal* experience is not expressly drawn.'[160] Although in 1827 Christison had not published his textbook, nor made a large number of court appearances, his experience still exceeded that of his colleagues. Upon being questioned in court as to his experience detecting arsenic in criminal cases, he replied: 'I have frequently had occasion to analyse complex fluids, purposely poisoned with arsenic, and have twice before this case, and once since, detected arsenic in the contents of the stomach of persons poisoned with it.'[161] Christison had the last word, rhetorically asking whether Mackintosh had examined even a

[159] Ibid, 88, 91.
[160] Robert Christison, 'Observations on the Duration of Cholera, the Taste of Arsenic, and its Power of Preserving from Decay the bodies of those poisoning with it- being an answer to Dr Mackintosh's Reply,' *Edinburgh Medical and Surgical Journal*, 28, no. 92, (1827): 101. Italics in original.
[161] Christison, 'Account of the Medical Evidence,' 457.

single case of arsenic poisoning, knowing he had not.[162] It was a pointed reminder that Christison was, ultimately, better qualified than Mackintosh to make observations in a case of criminal poisoning. Essentially, Christison's ability to rely on his own first-hand knowledge, not just foreign authorities, put him a cut above Mackintosh.

Christison published his seminal *A Treatise on Poisons in Relation to Medical Jurisprudence Physiology and the Practice of Physic* in 1829, which cemented his place as an expert toxicologist and provided him with huge influence over newer generations of practitioners. It represented the success of his efforts to place himself amongst the ranks of foreign toxicologists without relying on them, and separating himself from ordinary practitioners. The very act of writing a textbook for ordinary medical men was a clear signal of his position at the top of the toxicological profession, but for Christison, setting himself up as a national leader of the field meant creating a complex relationship between himself and Continental toxicologists. The writers of the *EMSJ*'s review of Christison's *Treatise*, while candidly admitting to bias in favour of their 'professional son', stated:

> …we declare our decided preference of the volume before us, to the most valuable productions of Germany or France… we have not the most remote intention of undervaluing the labours of Dr Christison's predecessors, for without their assistance he could not have produced a work like the present.[163]

In the preface, Christison pointed out several instances where his *Treatise* deviated from past works on toxicology. Although he argued that the work of German and French authors was an essential part of the *Treatise*, he stated 'I have turned my personal experience as

[162] Christison, 'Observations on the Duration of Cholera,' 110.
[163] 'A Treatise on Poisons, in Relation to Medical Jurisprudence, Physiology, and the Practice of Physic,' *Edinburgh Medical and Surgical Journal*, 33, no. 102, (1830): 201.

much to account as was in my power.'[164] This set Christison apart from his predecessors and the ranks of ordinary toxicology practitioners, who seldom had any practical experience. Crowther describes the final edition of Christison's textbook as 'a monument to the international cross-fertilization of scientific knowledge in the early nineteenth-century'.[165] It was not, like the early publications of Beck and Paris, a compendium of the work of others. Instead, it was an interweaving of his own and others' work, designed to fill holes in his own experience and vice versa. The *Treatise* can be viewed as a decisive break for Christison, as it provided him ample scope to show the extent of his own research and critique the work of those who had gone before. The strategies Christison employed to establish himself as an expert on his own merits required him to legitimise his position not just through his own efforts, but also by favourable comparison against others. His eventual success supported the professionalization of Scottish toxicology, as the Continent was no longer the source of all toxicological knowledge.

English Expertise

English toxicology was also connected to Continental toxicology; however, it was just as strongly influenced by Scottish toxicology in the form of Christison's pioneering work. Examples of English toxicology following the pattern of development set by Scotland are plentiful, and strongly indicates the connection between the professions. The English expert class also began with one individual in the person of Taylor, who began his career in the early 1830s and came to dominate English toxicology for most of the century. His career path was similar to Christison's, having studied in his home country, then travelled to France

[164] Christison, *Treatise,* xiii.
[165] Crowther, 'The Toxicology of Robert Christison,' 126.

to continue his training, and eventually returning home to take on a lecturing post at a relatively young age.[166] Although Taylor was preceded as a lecturer on medical jurisprudence by Anthony Thomson and John Gordon Smith, neither achieved the rise to fame that Taylor did, nor left anything close to the lasting impression of Taylor on toxicology as a profession.[167] As discussed in Chapter One, medical jurisprudence was only studied in England from 1829, thus there was little opportunity for men wanting to specialise in the subject. Prior to the emergence of Taylor and other experts, Watson argues that academic chemists were the main source of expertise in poisoning cases, if an ordinary medical man proved inept.[168]

It is more difficult to trace Taylor than Christison, as not only did he frequently write editorials and articles anonymously, but also was not much involved with medical societies or discourse.[169] As Taylor did not leave an autobiography, most information about his life and career must be inferred from his writings. Coley asserts that Taylor attended Orfila's lectures, although this is difficult to substantiate.[170] What is clear is that he did make use of the Continental toxicologists as well as Christison, before building a reputation on his own merits. Taylor's frequent citation of Christison's work in his own *On Poisons in Relation to Medical Jurisprudence* in 1848 is a reflection of the way Christison had cited Orfila two decades earlier. It could reasonably be taken as confirmation of Crowther and White's theory regarding the growing confidence of British toxicology, and definitely indicates the impact Christison had made on the field since his appointment. The fact that British

[166] For biographical details on Taylor, see: Coley, 'Alfred Swaine Taylor,' 409-27.
[167] Coley discusses Smith's failure to cement medical jurisprudence as a subject, despite being one of its first lecturers and publishing a book on the subject. Coley, 'Alfred Swaine Taylor,' 412.
[168] Watson, *Poisoned Lives*, 163-168.
[169] 'Obituary. Alfred Swaine Taylor, M.D., F.R.S.,' *British Medical Journal* 1, no. 1015, (1880): 906.
[170] Coley, 'Alfred Swaine Taylor,' 412.

toxicology had its own expert in Christison before Taylor began on the subject gave him an advantage, although like Christison he still had to build a reputation from his own research to justify his place as an expert.

Although Taylor was involved in several trials in the first half of the century, there is no record of him arguing with other witnesses as Christison had. This could, of course, mean that any arguments he may have had with other witnesses did not take place in medical journals, for as Christison's argument with Mackintosh explained, it was not uncommon for medical men to settle disputes privately rather than publicly and, prior to their exchange, the two men had done just that.[171] This was a practice also insisted upon in other journals, like the *LMG*, although it was not always adhered to. Alternatively, it may indicate that there were no occasions on which Taylor's testimony could be contradicted. Generally, in the most significant cases Taylor testified in like that of Mary May (one of the so-called East Anglia Poisoners in the 1840s), scandal arose because of societal fears about secret poisoning rings, rather than any toxicological controversy.[172] Despite there being less evidence of Taylor's activities than Christison's, there are still examples of Taylor defining the role of experts and ordinary practitioners, and beginning to establish himself as the English counterpart of Christison.

Taylor's experimentation with the solubility of arsenic in water in 1837 gives some indication of the profession's state in England at the time, and the situation in English toxicology in which Taylor was establishing himself. This was one year after he had

[171] Mackintosh, 'Reply to Professor Christison,' editor's footnote, 84. The editors insisted that they were making an exception in publishing the exchange between the two men, as the journal generally preferred not to 'admit articles of personal controversy.'

[172] For more on the East Anglia poisoners and perceptions of female poisoners see: Victoria M Nagy, 'Narratives in the courtroom: Female poisoners in mid-nineteenth century England,' *European Journal of Criminology* 11, no. 2, (2014): 213-227.

published his first book, the well-received *Manual of Medical Jurisprudence*, which confirmed his status as an expert in medical jurisprudence, although the *Manual* did not cover toxicology. Prior to the results of his own experiments, Taylor summarised the findings of eight German toxicologists and chemists at length, and eight of various nationalities including Orfila and Christison, as they gave the results of the previous experimenters in their textbooks.[173] Taylor stated that he was not able to find an example of an English chemist performing any such experiments, and that English chemists he mentioned, Anthony Thomson, William Henry, and William Brande, had all used the results of the foreign chemists. This indicates the scarcity of high-level toxicologists in England, as while Brande and Thomson did occasionally act as expert witnesses, they were primarily chemists with other focuses. The parallel between Christison and Taylor at early stages of their careers is clear. It also shows that Taylor was essentially leading progress in English toxicology, being amongst the first to make experiments on the Marsh test in England, which was invented just a year earlier, in 1836. Additionally, the small number of Englishmen Taylor listed shows how small the community of experts was in England. The majority of references to English works in the article were to Christison's *Treatise on Poisons,* which was still the only comprehensive work on toxicology in English at that point.

In 1843, Taylor contributed a case he had been involved in to *GHR*, which clearly illustrates the numerous personal and professional connections that he, as an expert, utilized in his investigations. Despite being very different to the Smith case, and although Taylor was a firmly established expert at this point, this example shows him using similar strategies to consolidate his position. Published as a 'Case of Suspected Irritant Poisoning',

[173] Alfred Swaine Taylor, 'Two cases of fatal poisoning by arsenious acid: with remarks on the solubility of that poison in water and other menstrua,' *Guy's Hospital Reports*, series 1, 2, (1837): 83-91.

Taylor related how a family of four had eaten mutton for dinner, causing all four to become badly sick, resulting in the death of the youngest child the next day. The attending doctor, Cooke, suspected poisoning, and as the father was the least affected and was not on good terms with his wife, he appeared to be the guilty party. Cooke applied to a chemist for analysis, but upon receiving a negative result, sent the viscera to Taylor for a secondary analysis. Taylor also found no poison, and in his report investigated further to establish the truth of the case.[174]

Taylor built his analysis of the case around the assumption that his negative results for poison were correct, and without room for error. He used eight cases to illustrate his arguments, five British (one of which was a case of Christison's) and three foreign, discussed exhibits of the Hospital museum, and made brief references to a number of other unspecified cases. His liberal use of case studies shows he was engaging with other practitioners and authorities, through medical journals and reports. He also referenced Continental toxicologists, noting that for work on food becoming poisonous through putrefaction, foreign authorities were the best to consult.[175] However, in contrast, Taylor did not try to justify his chemical testing, nor his opinions on the case, rather used the case studies to illustrate his points. His confidence in pronouncing his opinions on the probability of poisoning did not come from the use of other toxicologists' work, but rather his own experience, as evidenced by the absence of any quotations, footnotes, or name-dropping in these passages. Just as Christison in his early years consolidated his position as an expert by

[174] Alfred Swaine Taylor, 'Case of Suspected Irritant Poisoning, with Remarks on the Poisonous Properties of Certain Kinds of Decayed Animal Matter used as Food,' *Guy's Hospital Reports*, series 2, 1, (1843): 1-25.
[175] Ibid, 9.

emphasising his personal experience, so too did Taylor, as his own knowledge became more prominent in his writing.

Once firmly established as an expert, Taylor began to make judgements on the nature of his position, as well as how practitioners of toxicology should be engaging with one another. In 1846, the *LMG* published a series of Taylor's lectures on medical jurisprudence. In the first lecture, Taylor described his view on expert witnesses, which was contrary to his own practice. He stated that the study of medical jurisprudence and particularly toxicology was essential if a medical man wished to avoid 'the disgraceful necessity of employing some "*analytical chemist,*" at a distance, to undertake the analysis of a suspected poisonous substance. There may be complex cases in which the assistance of others will be required, but these are only of an exceptional nature.'[176] This appears unusual, given that Taylor's career and reputation was built on acting as a consultant in these 'exceptional' cases. Moreover, in subsequent decades Taylor worked closely with two analytical chemists, William Odling and George Owen Rees, whom historians generally regard as being more skilful practitioners of toxicological testing than Taylor himself.[177] In the next passage, Taylor insisted that the lack of experience of some practitioners had resulted in acquittals, which again contradicted his insistence that calling in help should be a last resort.[178] This incongruity between Taylor's rhetoric and practice can be resolved by considering several factors. One of these was practical. By 1846 Taylor was an established medical witness and lecturer, and while his activities within the courtroom required others to call him in, within the classroom he needed as many students and their fees as possible,

[176] Alfred Swaine Taylor, 'A Course of Lectures on Medical Jurisprudence. Delivered at Guy's Hospital, by Alfred S. Taylor, F.R.S. Lecture I.,' *London Medical Gazette*, n.s., 2, (1846): 7. Italics in original.
[177] Coley, 'Alfred Swaine Taylor,' 413.
[178] Taylor, 'A Course of Lectures,' 7.

and thus wanted to make his subject seem as important and necessary as possible. This alone does not resolve the contradiction, as he still appears to disparage the foundation of his career as expert witness. However, it does make sense when combined with another factor, namely Taylor's perception of his own position. Taylor had held his position at Guy's Hospital for sixteen years and testified in a number of trials as a toxicologist, so it is likely that when he disparaged analytical chemists, he was speaking of local chemists and apothecaries who belonged to the lower tier of practitioners, rather than himself and his colleagues. In exhorting young medical men to become proficient in toxicology, he was not suggesting that they should not require assistance from experts like himself when they needed it, but rather that they should be self-sufficient in all but the most difficult cases; at which point they became the concern of men like Taylor, rather than local chemists. In this, Taylor constituted not just his own position, but the positions of all experts, drawing a clear line between the ordinary and the expert practitioner. His unwillingness to concede the mantle of expert to anyone without his level of skill could be viewed as a defence of the profession; letting medical men claim expertise they did not have it was endangering the reputations of real experts, and thus the reputation of toxicology as a reliable science.

Crossing National Borders

The difficulty of examining toxicology in Scotland and England as entirely separate has been mentioned previously, and part of the reason for this is that they increasingly overlapped as the century went on. Evidence of direct collaboration between Christison and Taylor in the courtroom in the first half of the century is negligible; however, there is evidence that they were communicating by 1845. As mentioned, Taylor frequently referenced Christison in his textbooks, but as the last edition of Christison's *Treatise* was

published the year after Taylor published his first *Manual*, only the final edition references Taylor. In the final edition of *Treatise*, Christison noted a discovery about the action of acids 'Mr. Alfred Taylor informs me he has lately found.'[179] Additionally, there are other examples of Christison and Taylor collaborating outside of their textbooks. Robert Flanagan and Katherine Watson have explored the case of Hannah Russell, in which Taylor and Christison both attacked the testimony of a self-proclaimed expert over the time arsenic takes to kill a person, which was noted by both in their subsequent textbooks.[180] Another such instance is in the controversy occasioned by Orfila's discovery of 'normal arsenic'. In 1839, Orfila claimed that toxicological testing was compromised by the existence of arsenic that occurred naturally in human bones. This episode has been well-traversed by Burney, particularly regarding the consequences of the incident for British toxicology.[181] The way in which Taylor and Christison responded to the controversy, in denying the truth of Orfila's findings, marks a clear attempt by these toxicologists to distance themselves from Orfila. In a reversal of the usual pattern, instead of using Orfila's findings to support their own claims, both men used their own experiences and experiments to discredit Orfila's conclusions. The normal arsenic theory was used as a defence in a number of British poisoning trials, making it all the more important for the British toxicologists to disparage the notion.[182] Burney discusses the way in which Orfila's faults were classified as being related to issues of the French profession, essentially isolating the British experts from the controversy.[183] It is a

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[179] Robert Christison, *A Treatise on Poisons: In Relation to Medical Jurisprudence, Physiology and the Practice of Physic* 4th ed., (Edinburgh: Adam Black, 1845), 153.
[180] Robert Flanagan and Katherine Watson, 'A petition to Mr Peel: Gideon Mantell and the trial of Hannah Russell,' *Medicine, Science and the Law* 49, no. 2, (2009): 153-69.
[181] Burney, 'Bones of Contention,' 243-59.
[182] 'WILLIAM RICHARDSON, ANN MARIA RICHARDSON, Killing > murder, 11th May 1846,' Old Bailey Online, accessed 15 February 2017. https://www.oldbaileyonline.org/browse.jsp?div=t18460511-1182; Burney, 'Bones of Contention,' 255.
[183] Burney, 'Bones of Contention,' 253.

clear example of the British toxicologists defining their profession as separate to that of the Continent, and thus expert in its own right.

Overall, instances in which Christison and Taylor were challenged by other toxicologists were few, and seldom by anyone of their own calibre. This is due not only to the slow growth of the profession, but also to the fact that expert witnesses were more commonly employed by the prosecution than the defence. The mechanisms of inquests and the investigations of fiscals ensured this. However, this changed drastically, as in the decades approaching the middle of the century, the men who became the contemporaries of Christison and Taylor emerged. In Scotland, Douglas Maclagan was teaching toxicology and chemistry in the extra-mural Edinburgh school by 1845, while Henry Littlejohn senior graduated with his medical degree in 1847.[184] Both men became frequently-summoned witnesses in the sensational trials of the second half of the century. In England, Henry Letheby, who opposed Taylor several times in the second half of the century, was a frequent contributor to the *LMG* on toxicological issues by the 1840s, and was involved in consulting in cases of poisoning.[185] As these men and others became experienced toxicologists, the expert rank of toxicology that had previously been dominated by Christison and Taylor expanded, with significant consequences for toxicology in Scotland and England.

The creation of authority in toxicology set several patterns of interaction and practice that affected the development of toxicology. The pattern of emulation followed by separation is clear in the careers of both Christison and Taylor. This is hardly surprising, as it would be rare for any man to become an expert in his field without following in the

[184] Kaufman, 'Origin and History of the Regius Chair,' 126.
[185] Henry Letheby, 'Report of a Case of Poisoning by the Seeds of Jatropha Curcas,' *London Medical Gazette* n.s., 7, (1848): 116-7; Henry Letheby, letter to the editor, 'Dr. Letheby's Case of Poisoning with Oxalic Acid,' *London Medical Gazette* n.s., 1 (1844-5): 49.

footsteps of his predecessors. The parallels that exist between the careers of Christison and Taylor are also clear in the development of toxicology in Scotland and England more broadly. Toxicology developed sooner in Scotland than in England, so England essentially followed Scotland's footsteps. Therefore, the emergence of the Scottish tier of experts relied on toxicological knowledge from the Continent, while the upper tier of English toxicologists relied on the already extant Scottish tier as well as Continental knowledge. Because the expert class in both countries remained very small in the early decades of the century, toxicologists' ability to influence practitioners was essentially concentrated in a small group of individuals, including Christison and Taylor. Attaining intellectual independence from Continental toxicology was a key part of forming an individual profession.

Just as important for toxicologists was distancing themselves from ordinary practitioners. However, this distancing occurred not in terms of education or assistance, but in skill and reputation. It was important for toxicologists to portray themselves as superior to the men who previously served as experts in the field, in order to place themselves in a position to influence the profession. Because toxicology was a new science in the nineteenth century, the creation of a body of practitioners was inevitable, as was the fracturing of this body by different skill levels. For the toxicologists aiming to make toxicology a subject of professional expertise, the relationships they had with other practitioners were important. The similarities in how and why Christison and Taylor defined themselves as experts created a strong link between the Scottish and English professions, shaping them from their early years, and creating similar relationships between the upper and lower tiers of practitioners. In the context of toxicology, these relationships were especially important, because, as is explored in the next chapter, a large proportion of trial

practice was predicated on interactions between practitioners. The creation of authority within toxicology was intrinsically linked with later developments, including networks of knowledge, the definition of the role of the toxicologist, and increasing specialisation, all of which are the subjects of following chapters.

Chapter Four: Networks of Knowledge in Toxicology

The creation of networks of knowledge was a process that occurred concurrent with the construction of toxicological authority; both processes relied heavily on media such as medical journals, and neither could have existed without the other. However, while examining the creation of authority requires looking at the techniques and strategies the toxicologists used to constitute their positions in the eyes of others, examining the creation of networks means assessing exchange and interaction. This includes how the toxicologists participated in exchange with ordinary practitioners, how these practitioners utilized the toxicologists' authority for their own benefit, as well as interactions and knowledge sharing between toxicologists. As established toxicological authorities, Christison and Taylor are the two most useful toxicologists to follow, because they had strong influence over other practitioners. This influence spread through journals, textbooks, correspondence, and personal contact, forming networks that eventually exceeded national boundaries and contributed to the convergence of toxicological practices in each country. This chapter examines the evidence for networks in toxicology, and the consequences they had on the development of the profession, and how they affected the outcomes of trials.

Defining Networks

'Networks of knowledge' is perhaps the most nebulous concept in this thesis, but it reveals some of the most interesting aspects of how toxicology developed both in and out of public arenas. The value of networks as a concept lies in the way they encompass complexity and multiplicity of interaction, allowing for reciprocity and agency of all involved parties. Networks as a framing theory have been used most frequently in recent scholarship on transnational and scientific subjects. Although not strictly related to toxicology, the way

these areas of scholarship have utilized networks as a framework has guided the construction of a network framework appropriate for toxicology. John Gascoigne's work on science and Empire in the early nineteenth century describes imperial networks as being largely informal, dominated by individuals, and intertwined with official agencies, until these patterns began to alter in the 1820s.[186] Toxicology followed similar patterns for most of the century. Through their private networks, toxicologists were prepared to work outside of bureaucracy when it suited them, and dealt with one another directly through correspondence the majority of the time. Similarly, the dominant individuals of toxicology persisted throughout the century, unlike the dominant individuals of imperial networks. Simon Potter both surveys recent approaches to imperial networks and argues for the consideration of homogenisation and standardisation as altering the effects of networks.[187] The increasing institutionalisation of medical and scientific expertise in the second half of the century altered the operation of the networks, a process further discussed in Chapter Five.

Histories of networks in science are equally valuable. Secord discusses the importance of approaching histories of science using networks, because focussing solely on knowledge production assumes the one-way diffusion of knowledge to passively accepting audiences.[188] This is to consider that aspects like the target audience of the medium, the way it presents knowledge, and how the medium allows for reply and reaction, are all equally as important as the author. Angela Schwarz describes scientific networks spanning

[186] John Gascoigne, 'Science and the British Empire from its Beginnings to 1850,' in *Science and Empire: Knowledge and Networks of Science Across the British Empire, 1800-1970*, eds. Brett M. Bennett and Joseph M. Hodge, (Hampshire: Palgrave Macmillan, 2011), 54.
[187] Simon Potter, 'Webs, Networks, and Systems: Globalization and the Mass Media in the Nineteenth- and Twentieth-Century British Empire,' *Journal of British Studies* 46, no. 3, (2007): 621-622.
[188] Secord, 'Knowledge in Transit,' 662.

between England and Germany in the nineteenth century, noting the importance of not only published texts, but also correspondence between individuals, in maintaining networks. She argues that while the emergence of scientific societies and institutions promoted interaction, these were not essential to the formation of networks.[189] This is particularly relevant to toxicology, as the combination of published texts and correspondence were the main conduits practitioners used for networking.

Toxicological Networks

This chapter, as stated above, intends to examine intellectual and professional networks in order to understand the development of toxicology across the nineteenth century. Exactly what these networks were and how they operated requires further discussion; for toxicology as a profession was a microcosm within British science, acted upon by internal and external forces. In a more practical sense, what this means is that when practitioners of toxicology engaged with one another to impart, receive, or exchange knowledge, they were creating and maintaining networks of knowledge. The interactions Christison and Taylor had with ordinary medical men are a crucial part of understanding how toxicology was constructed by its practitioners; as while the top toxicologists were undoubtedly hugely important in this process, the ordinary medical men they networked with made up the bulk of the profession. None of the men practising toxicology worked in isolation, and so to consider Christison and Taylor without considering the men they wrote for, to, and about, is to miss the point of their work. Therefore, to approach toxicology through networks is to build a broader picture of a community of toxicologists endeavouring

[189] Angela Schwarz, 'Intersecting Anglo-German Networks in Popular Science and their Functions in the Late Nineteenth Century,' in *Anglo-German Scholarly Networks in the Long Nineteenth Century,* eds. Ulrike Kirchberger and Heather Ellis, (Leiden: Brill, 2014): 70.

to make their science into a respectable profession, and to see how the networks of knowledge they formed were essential to this process. The communities of professional toxicologists in Scotland and England were not big enough to facilitate national networks; instead, they created a series of overlapping networks. However, while networks cannot necessarily be divided by geographical boundaries, there was an element of national division, in that ordinary practitioners naturally went to nearby available toxicologists when possible. This meant that toxicologists, as focal points for these networks, had constituencies based loosely on proximity, but with the capacity to expand beyond national borders.

The two kinds of networks that formed within toxicology had important implications for the science, and examining both types shows the extraordinary influence of the top toxicologists on toxicology as a whole. Both are revealed most clearly in the medical journals, which are the focus of this chapter. The first kind were networks of knowledge maintained within the forums of the medical community, performed through mediums like the medical journals. These networks were visible not only to medical practitioners but to anyone who engaged with the journals. The medical journals contain numerous examples of high-ranking toxicologists as well as ordinary doctors publishing articles on cases of toxicological interest, and generating replies from others. The examples of ordinary medical men contacting the great toxicologists, who were significant distances away, combined with their engagement with the medical journals, are important in understanding how ordinary practitioners used networks to overcome the obstacles posed by their locations and wealth. The purpose of these networks was simply to disseminate knowledge through the community of practitioners, which could aid or interest others. Christison outlined his plans to report cases for their value, based on ‘the illustration they furnish of established

doctrines in medical jurisprudence, or by the new views which they suggest.'[190] Interaction through public mediums was generally beneficial, as it allowed practitioners to display their skills and connections to the wider community.

The second kind of networks were concealed from all but toxicology practitioners, operating largely through personal correspondence and face-to-face contact. Through these private networks, practitioners of toxicology received practical assistance and advice from the great toxicologists for their appearances in court, and essentially circumvented the legal processes that this usually entailed, as described in Chapter Two. This had benefits for toxicology's reputation in the eyes of the courts and the public, creating an appearance of competency and cohesiveness. The lack of surviving correspondence between medical men and toxicologists, as well as the difficulty of accessing what has survived creates a methodological issue. However, the medical journals, although not a part of the private networks, occasionally revealed the existence and extent of the webs of correspondence, which makes it possible to reconstruct some of the private interactions that are otherwise invisible. Therefore, this chapter will closely examine the admissions the experts made about private networks, combined with evidence found in the medical journals, to create a fuller picture of the extent and reach of the networks. These private networks are hugely revealing of the mechanisms by which toxicologists worked around challenging legal processes, in an attempt to reconcile the differing demands of scientific and legal communities. Private networks are the priority of this chapter, as they show most clearly the tangible impact interactions between toxicologists had on their courtroom practices.

[190] Robert Christison, 'Cases and Observations in Medical Jurisprudence. I. Imputation of Poisoning. II. Poison with Arsenic.,' *Edinburgh Medical and Surgical Journal*, 29, no. 94, (1828): 19.

The Early Decades

The forging of networks between practitioners of toxicology was important for the growth and development of the science, and was essentially jumpstarted by the rise of the experts. Toxicology was a negligible part of the medical profession before the 1820s and 1830s; it was a science on the fringes, and was not widely recognised until the experts made it so. The roles of Christison and Taylor in making toxicology an essential subject of study for all medical men has been discussed in Chapter One, as well as the changes in medical licencing that cemented medical jurisprudence in the medical curriculums of Scotland and England. It followed naturally that these changes created demand for toxicological knowledge amongst ordinary doctors. Thus, with a ready-made constituency of practitioners, an established medium in the form of the medical journals, and experts first in Christison and then Taylor, the conditions were favourable for the creation of networks within Scottish and English toxicology.

The public networks formed relatively rapidly within the journals with Christison and Taylor featuring regularly, both contributing to and being referenced in the medical journals. The medical journals were just as essential to the creation of networks as to the creation of authority. As the top toxicologists published more frequently and established their authority, they provided opportunities for ordinary practitioners to respond. They did so in a number of ways, including the citation of an expert's work, and discussion of their cases or experiments. However, upon closer examination of some of these exchanges, it becomes clear that they are also evidence of the private networks of toxicology. These pieces of evidence are important not just for the contact that they show was occurring, but for the larger networks of contact that they hint at. The few passing references to contact

between the experts and ordinary practitioners that took place out of the medical journals give an indication of some of what passed between the tiers of practitioners that is otherwise invisible to the historian.

Both the experts and ordinary practitioners benefitted from advertising their contact with each other in the medical journals. For ordinary practitioners, citing the toxicological authorities gave their work credibility, and the ability to reference these authorities while testifying in court, a practice that spread from Scotland to England, was especially helpful.[191] In 1849, the *LMG* reported a trial of poisoning, in which the victim was advised to take significant quantities of the medicinal but dangerous plant *lobelia inflata* as a remedy for illness, which resulted in his death. The prosecution read from the works of Christison and Taylor regarding the poisonous qualities of the plant for the benefit of the jury.[192] Examples of this are more frequent in the 1840s, which is to be expected as the number of Taylor's published works was increasing along with his prestige, and Christison's *Treatise* was in its fourth edition. For the experts, publishing cases they had been involved in, or experiments they had conducted, reminded readers of their status as authorities. While they, too, cited other experts in their articles, they also often acknowledged the receipt of interesting cases or facts from ordinary practitioners in their own work. These examples of contact through the public networks of knowledge are also valuable for providing some insight into the private networks.

Both toxicologists interacted with other medical men frequently, and when these interactions were part of the public networks, there is plenty of evidence of them in the

[191] Christison, *Treatise,* xiv. The practice of reading toxicological texts in English trials was initially banned, but became more common as the century went on.
[192] 'Poisoning by Lobelia Inflata- Charge of Manslaughter,' *London Medical Gazette*, n.s., 9, (1849): 384.

medical journals. In one of his contributions to *GHR*, Taylor recounted twenty-four cases that had taken place over three years, which required either his analytical skills or his opinion. Of these, twenty were poisoning or suspected poisonings. Several cases were those of Taylor's former students, while in others the attending doctors had no apparent personal connection to Taylor.[193] The 1843 case of suspected irritant poisoning in the previous chapter is an earlier example of the same situation. What this shows is that by the 1840s many students had passed through Taylor's hands, and many were clearly still in contact with him, providing him with the basis for a network of interaction. Other examples of interactions show this actually occurring. A letter from Christison to an acquaintance on a new preparation of 'muriate of morphia' made the pages of the *EMSJ* in 1831, showing that the author had consulted him regarding the chemical process.[194] A correspondent to the *LMG* was advised in the notices section that he should 'apply to Dr. Christison, who will, we are sure, furnish him with an answer.'[195] The *LMG*, publishing the small notice in 1846, apparently knew that Christison was in the habit of answering toxicological questions for both friends and strangers from across national borders. This was not a common practice of the journal, as although it did answer inquiries and recommend books to correspondents, there is no other example of them recommending contacting a third party in any of the other 1846 editions. This is also interesting because the *LMG* was naturally London-based, which shows how far Christison's reach was, and by extension proves that Scottish toxicology had influence extending into the heart of England before the middle of the century. These pieces of evidence are valuable because although they are just small

[193] Alfred Swaine Taylor, 'Cases and Observations in Medical Jurisprudence,' *Guy's Hospital Reports*, series 2, 7, (1851): 183-232.
[194] William Gregory, letter to the editor, 'On a process for preparing economically the Muriate of Morphia,' *Edinburgh Medical and Surgical Journal*, 35, no. 107, (1831): 335-7.
[195] 'Notices to Correspondents,' *London Medical Gazette*, n.s., 2, (1846): 533.

mentions of the interactions of ordinary medical men with the experts, they indicate further, unseen interactions. It is clear that there was a flow of correspondence throughout the careers of Christison and Taylor that is otherwise invisible, as both answered questions, performed analyses for, and corresponded with colleagues, students, and strangers. Both were clearly accustomed to doing far more than just consulting on criminal cases through official channels. However, two trials that took place in the mid-1850s forced both toxicologists into revealing the extent to which they engaged with other practitioners, out of sight of the courts, the medical journals, and the public. In doing so, they proved that these small instances of private contact revealed by the medical journals were likely just the tip of the iceberg, and that the networks of toxicological knowledge were far larger than they appeared.[196] This has implications for trial statistics as well as close reading of trials, and is essential in considering the converging development of toxicology in Scotland and England.

Private Networks

The 1850s contained some of the most contentious poisoning trials of the century, which severely rocked toxicology as a profession and laid the groundwork for the changes in practice that occurred at the end of the century. While a number of trials laid pressure on the toxicologists, two in particular forced interesting confessions, displaying the extent of the private networks of knowledge as they had never been seen before. In 1856, Joseph Wooler was tried for the murder of his wife by poison, and acquitted. Both Christison and Taylor became involved as witnesses, and the former had to explain the private networks he maintained in order to stay out of trials like the Wooler case, which in this instance had

[196] It is important to realise that these examples are only visible because the system was disrupted, and thus made public. If there were plenty of examples, then the network could hardly be considered private.

failed. The 1856 trial of William Palmer and its consequences have been thoroughly explored by Burney, as accusations of partisanship amongst the witnesses and some of the fiercest intra-professional disputes arose as a result of the sketchy toxicological evidence.[197] In this instance, Taylor had to defend his reputation by exposing the extent of his dealings with other medical men. Both admissions have significant consequences for any examination of networks of knowledge in toxicology.

Although the Wooler case was never considered important enough to warrant its own *Notable Trials* book, it did create significant interest within both the public and scientific communities. It elicited a crucial piece of evidence about Christison's involvement in private networks of toxicology, the consequences of which are relevant to both Scotland and England. In June 1855 in Darlington, Durham, Mary Wooler, the wife of Joseph Wooler, became violently ill after an evening meal. Her illness lasted for nearly two months, despite a variety of treatments given by the three doctors her husband had called in. All three doctors reportedly began to develop suspicions of poisoning, but before they attained definitive proof, Mrs Wooler died.[198] The inquest returned a verdict of murder by poison but did not specify a culprit. A petition for further investigation from her relatives resulted in Joseph Wooler being committed for trial, accused of the murder of his wife.

Both Taylor and Christison testified for the prosecution. The two were called in separately in what was, in terms of the chemical evidence, a relatively clear-cut case. While the inquest jury pressed the coroner to utilize Taylor, the medical men involved had already gone to Christison, without the court's knowledge. During Mrs Wooler's illness, the

[197] Burney, *Victorian Imagination*, 116-151.
[198] Robert Christison, 'Account of a Late Remarkable Trial for Poisoning with Arsenic,' *Edinburgh Medical Journal*, 1, (1855/6): 627-8, 630.

Darlington doctors applied to Christison for an expert opinion rather than make accusations of poisoning without firm backing, fearing repercussions if they were wrong; but she died before Christison could return his findings.[199] During the subsequent inquest, the jury requested that Taylor analyse the remains, unaware of Christison's prior involvement in the case.[200] Christison's name was only elicited from the reluctant witnesses after they were forced into admitting they had consulted 'an authority' for toxicological assistance, leading to Christison being called as a witness alongside Taylor.[201] This explains why two such eminent men were involved in a case that proved no great test to their respective skills. In addition to indicating that the medical witnesses were not confident enough in their findings to do without an expert's opinion, their actions show that they were not confident of receiving one if the decision was left in the hands of the court. Importantly, the confusion displayed the willingness of the medical witnesses to circumvent legal procedure, in going to Christison without the knowledge or approval of the court.

Christison published an article on the Wooler trial in the *Edinburgh Medical Journal*, discussing the case and its important medico-legal aspects. In a lengthy footnote he explained how he came to be involved in the trial, and why the medical witnesses had withheld his name from the court for so long:

> My reason for desiring that no notice should be taken of my having given evidence in the case was simply, that I have for some years given up the charge of medico-legal inquiries at a distance from home; that although I frequently give advice in such cases, when asked to do so by my medical friends and others at a distance, I give it on the condition that I shall not be

[199] Ibid, 625.
[200] Watson, 'Medical and Chemical Expertise,' 387.
[201] Christison, 'Account of a Late Remarkable Trial,' 626.

> involved as a witness; and that, if I am to run the risk of becoming a witness by my gratuitous services to my professional brethren, I must cease to render them, because absence in distant places, on such account, is incompatible with my professional and professorial duties at home.[202]

Christison had plenty of obligations to fulfil at home, as in 1856 he was the Professor of *Materia Medica* and Clinical Medicine at Edinburgh University, Ordinary Physician to the Queen in Scotland, and one of the leading medical jurists in Scotland. The Wooler trial took three days, of which Christison was present for two; adding to this the two days of travel minimum to get from Edinburgh to London and back again by train, one appearance at trial could take up the better part of a week. This makes it clear why Christison adopted an anonymous approach when assisting his colleagues, to circumvent the practical difficulties of carrying out his duties while enduring regular interruptions of travel and testimony. An additional point of interest is that although Christison offered to travel to the trial as soon as his involvement became known, he noted 'I was not then summoned. But eventually I was cited as a witness for the prosecution on the trial, because I was the only person who had obtained positive evidence of the presence of arsenic… [from the] patient during life.'[203] This implies that had the Darlington doctors or Taylor discovered arsenic positively, then Christison would not have been summoned.

This admission is also one of the few pieces of evidence that clearly shows the extent of the private networks of interaction Christison was maintaining. Enjoining his colleagues to silence saved him significant trouble, and short of finding the actual letters he exchanged with those who asked his advice, there is no way to conclusively prove his involvement in

[202] Ibid, 626.
[203] Ibid, 626.

cases where his name is not mentioned. It shows that Christison was deliberately and successfully concealing his interactions with ordinary practitioners, meaning his name does not appear in all of the court records that it should, the consequences of which will be discussed in a later section. The only reason Christison admitted this practice was because the circumstances of his involvement in the case had drawn criticism upon both himself and the Darlington doctors, which he wanted to refute. His statement does not provide any solid numbers, and there is no way of knowing how he defined 'frequently', or how long he designated as 'some years'. However, by 1856 Christison had held his post at Edinburgh for thirty-five years, so 'some years' is likely to have been a substantial period of time. Likewise, it seems reasonable to assume that he continued this practice despite his warning, as there does not appear to be another instance of Christison being summoned to London for a case that did not merit his involvement. Therefore, the network Christison was concealing was considerable in scope, covering not only Scotland but right into London, and even if 'frequently' meant less than five cases per year, over Christison's fifty-year career, the implications are enormous. The number of medical men who based their testimony on analyses or advice from Christison is difficult to accurately measure, but what is clear is that through these men Christison had a direct impact on the outcomes of many more trials and inquests than he actually testified in.

This was not just a Scottish phenomenon, as similar evidence about the practices of Taylor came to light just months after Christison's admission. Taylor did not make a direct statement like Christison, but evidence from his writings strongly indicates his involvement in private networks. Chapter Two noted that a number of historians have examined the Palmer trial, as it is considered one of the most important trials for toxicology in the nineteenth century. For the sake of not re-treading familiar ground, this thesis will not

assess the trial especially closely, but instead will consider a few interesting aspects. In late 1855, Palmer was indicted for the murders of his wife, mother-in-law, and gambling partner, the latter of which prompted the first trial. Expert medical witnesses were called for both sides on an unprecedented scale, including Taylor, Christison, Sir Benjamin Brodie, William Brande, William Herapath, Henry Letheby and George Owen Rees, to name only a few.[204] After the inquest on the gambling partner, Cooke, it was publicly revealed that Taylor, who had performed the initial tests, had found no strychnine (the suspected poison) in the remains, and only the smallest traces of antimony.[205] He subsequently gave an interview in the *Illustrated Times*, detailing some of the particulars of the Palmer case. Taylor's motive in granting the interview was ostensibly to lay to rest public fears about secret poisonings, but he made clear efforts to defend himself after his recent failures, explaining why strychnine was unlikely to be found, and affirming his experience and skill as a toxicologist. The interviewer noted that another journal had suggested that Taylor was involved in 150 criminal cases, and put this to Taylor:

> This statement appearing to us to be grossly exaggerated; we inquired as to its truth, and found that Dr. Taylor dispatched, in the course of a year, about 150 letters and confidential communications connected with chemical analyses or relating to cases of poisoning, real or suspected, but that each case involved on the average the writing of some half dozen letters, so that the number of mysterious deaths, as to the causes of which he was consulted privately, amounted to about 20 or 25 in the course of the year.[206]

[204] Knott and Watson, *Trial of William Palmer*, xi-xii.
[205] Ibid, 104-5.
[206] *Illustrated Times*, 'Our Interview with Dr. Taylor,' 1856, 27. British Newspaper Archive (BL_0000357_18560202_038_027).

The *Illustrated Times*, in taking Taylor's uppermost numbers as correct for every year of his career, put the total cases he had been involved in at around 500 over the previous twenty-five years.[207] It is clear that Taylor assisted medical men with both advice on cases and by performing analyses.

Katherine Watson's statistics of toxicologists who testified in trials are a useful tool against which to measure Taylor's numbers. Her statistics are derived from a representative proportion of English and Welsh depositions in poisoning cases, and put the number of cases Taylor testified in at thirty-one over his entire twenty-five-year career.[208] It is important to realise that the actual number was higher, because of Watson's sample size and focus on assize material, rather than the Old Bailey where a large proportion of cases Taylor was involved in were tried. Even multiplying Watson's statistics to make up for these gaps, the result is still substantially less that Taylor's estimate. It is important to consider that the *Illustrated Times'* article was published in 1856, so the numbers must be adjusted to what is known about Taylor's career subsequently. Taylor retired from his post at Guy's Hospital in 1878, but he had ceased performing toxicological analyses in criminal cases by 1873, if not earlier.[209] Watson puts the years between 1845 and 1869 as the peak years of Taylor's career, although he did perform analyses outside of this period.[210] However, if 1845 and 1869 are taken as parameters for Taylor's greatest period of activity, then the estimate of the *Illustrated Times* still stands as reasonably accurate. Even if Taylor exaggerated the numbers, the implications are substantial. For example, if Taylor consulted on fifteen cases

[207] Ibid, 27.
[208] Watson, *Poisoned Lives*, 167.
[209] 'Changes at the Medical Schools,' *The Lancet*, 2 (1878): 357; Alfred Swaine Taylor, 'Death from Disease or Poison. Does the Retention or Maintenance of Heat in a Dead Body Furnish Any Indication of the Cause of Death?' *Guy's Hospital Reports*, series 3, 19, (1874): 468.
[210] Watson, 'Medical and Chemical Expertise,' 384.

per year, and only half of these were toxicology related, that is still seven to eight cases per year, which, over twenty-five years of peak activity, comes to 175-200 cases, the vast majority of which had no record of Taylor's involvement.

Additional evidence from Taylor's writings corroborates the idea of his retention of private networks, in showing that, like the Darlington doctors, English medical men consulted Taylor without going through official channels. Taylor's semi-regular instalment in *GHR*, 'Cases and Observation in Medical Jurisprudence' demonstrates this. Although instalments of this piece differ in size and length, their purpose and format remained largely the same, making them more suitable for comparison than his other works. In these pieces, Taylor gathered cases that were of interest or instructive to medical jurists, the vast majority of which were poisoning. Taylor generally noted basic information about the cases, including location, case history, and how the case came to his notice. Out of the thirty-three total poisoning cases over six instalments, Taylor was directly involved in at least seventeen, noting how he came to be involved in each one. There were two main avenues through which Taylor became involved in these cases.[211] He could be requested to undertake a case by a coroner, once an inquiry into a death was underway. There are five examples of this in Taylor's writings, where he describes one instance: 'In a case… referred to me by the coroner of Sussex.'[212] However, more common than this was medical men bringing their cases directly to Taylor, without judicial mediation. There are eleven cases of this in Taylor's reports, which he described in cases like that of a suspicious death in 1850, 'I was consulted

[211] In these reports, there is one example of Taylor becoming involved in a poisoning case because the victim was brought to Guy's Hospital, but as this was a clear suicidal poisoning and a rare occurrence, it has little relevance to this chapter. Alfred Swaine Taylor, 'Cases and Observations in Medical Jurisprudence,' *Guy's Hospital Reports*, series 1, 3, (1838): 353-366.
[212] Taylor, 'Cases and Observations,' (1851): 206.

by Mr. W. H. Dry, surgeon… on the case of Mrs Bray.'[213] Taylor did not generally note subsequent inquest or trial proceedings, thus it is not always possible to tell which of the cases brought to him by doctors went to the judiciary. However, regardless of this, any death or poisoning warranted some kind of investigation or the signing of a death certificate.[214] From the evidence of his interview and writings, it is fair to suggest that Taylor was maintaining private networks, just as Christison was. Whether he, too, was using them to avoid going to inconvenient inquests and trials is harder to say, but it is clear that he had opportunities to do so.

The parallels between Christison and Taylor in this situation are clear. While Christison 'gave advice' and Taylor 'consulted privately,' both were interacting with medical men in poisoning cases outside of official channels. The only reason either toxicologist admitted to this practice was external pressures, as Christison had to explain his conduct, and Taylor had to defend his reputation. Although Taylor did not explain his motivations, it could easily be the same reason that Christison gave, as Taylor too was a busy man with many obligations. Ward's argument that Taylor was the only toxicologist in this period to earn his living solely from medical jurisprudence does not preclude him avoiding appearing in every case. Watson has noted that Taylor was frequently called as a witness to cases outside London, but that he insisted on a suitable fee to cover the costs of his time, journey, and analyses.[215] This was necessary due to the insufficiency of the *Medical Witnesses Act,* as discussed in Chapter Two. Because of this, and the instability of expert witnessing income,

[213] Ibid, 226.
[214] Death certificates were usually the job of a near medical man, and if a medical man was not satisfied as to the cause of death, he was obligated to inform the judiciary. Theoretically, all unnatural deaths were worthy of inquests. See: Burney, *Bodies of Evidence*, 3.
[215] Watson, 'Medical and Chemical Expertise,' 387.

his lecturing work at Guy's Hospital and his textbook writing, were far more reliable sources of income. Potentially, maintaining private communications prevented him from having to undertake more journeys than his work as a professor allowed, just as Christison did. However, regardless of Taylor's actual purpose in maintaining private networks, simply by keeping them he was influencing the outcomes of many inquests and trials.

Judicial Consequences

The effect of private networks on the law in Scotland and England are important to consider. There does not appear to have been any consequences handed down to the medical men in the Wooler case, nor Christison, nor did the medical journals comment on his admission. Scottish and English journals focussed on the unfair treatment of the Darlington doctors, whose conduct Christison had justified.[216] It is likely that Christison's position as an authority gave him licence denied to others. In other cases where multiple practitioners became involved in cases before the judiciary was alerted, such as the famous Chantrelle case, there was no question as to the conduct of the practitioners.[217] The same applies to the cases Taylor recounted in his 'Cases and Observations' pieces. This is hardly surprising; cooperation within the medical community was a given, and it was to the wider medical community that toxicologists belonged. What these cases demonstrate is that there was a recognised dissonance between the law and practice. Chapter Two discussed how, according to the law, all medical witnesses were considered competent, and thus were bound to, upon recognising a case of poison, immediately report it to the judiciary and perform all necessary tests and witnessing, with the help of experts in extreme cases.

[216] 'Observations on the Trial of Mr Wooler for Poisoning. By Professor Christison,' *Edinburgh Medical Journal*, 1, (1855-6): 759-761; 'The Burdon Slow-Poisoning Case,' *The Lancet*, 2, (1855): 613.
[217] A. Duncan Smith, ed., *Trial of Eugene Marie Chantrelle* (Edinburgh: William Hodge and Company Ltd, 1928), 83.

However, in reality, recognising poisoning cases was often very difficult, and for ordinary practitioners, consultation prior to anything else was the best option. Medical men contacting toxicologists of their own volition represented a lack of confidence in both their own toxicological skills and the ability of the judicial system to provide the necessary assistance. The Wooler case demonstrates that not only did the medical men not have faith in their own abilities, but nor did juries, who requested Taylor over another lesser analyst.[218] The fact that this process of consultation was considered appropriate indicates that although the legal definition of an expert witness was inflexible, in practice there was significantly more allowance made for the different skill levels of medical men.

Moreover, the private networks provide insight into the internal structures of toxicology as a profession. Firstly, medical men of Burney's lower tier of experts did not just consult the body of knowledge written by the experts. They were prepared to go straight to the experts for first-hand knowledge, and on a scale greater than testimony-based statistics or casual perusal of the medical journals indicate. This has implications for any examinations of intellectual networks within the profession, as the likelihood of deliberately concealed interactions must be taken into account. Secondly, the Darlington doctors were clearly prepared to go outside of England for expert toxicological assistance. Christison noted the small number of skilled English toxicologists in his remarks on the Wooler case, and asserted that this lack of available experts forced the Darlington doctors to consult him.[219] This reinforces the idea that national boundaries did not restrict the networks of knowledge, as the small communities of toxicologists in Scotland and England were not large enough to support strictly national networks. Additionally, the correspondence that these networks

[218] Watson, *Poisoned Lives*, 171.
[219] Christison, 'Account of a Late Remarkable trial,' 714.

operated through, much like the medical journals, allowed practitioners to consult toxicologists from anywhere in Britain. Unfortunately, there is no indication as to whether Scottish medical men consulted Taylor for toxicological assistance through private networks; however, there was nothing to stop them doing so if they wanted to.

It is worth considering how private networks may have affected toxicological practice. This applies particularly to Christison because of his out of court practices, but also any others toxicologists with similar practices. Chapter Two noted that Christison's reports became shorter as he grew in eminence. Without the pressure of needing to establish himself as an authority in court, Christison did not have to work so hard to convince juries of his reliability. Similarly, when he took on cases with the caveat that he would not be called to testify, he knew he would not be facing lawyers or opposing experts, and thus was not under the same pressures as in normal cases. Whether this affected how he performed toxicological testing or the advice he gave is impossible to say without further evidence; however, it does raise interesting questions about the extent to which courtroom procedures affected evidence production.

The private networks also cast new light on toxicology in the first half of the century. Both men stated that their practice of consultation had been going on for many years previous, and if the scale of Christison's private consultations were even close to the scale of Taylor's, then it seems that few criminal poisoning cases since the emergence of these men as experts would not have involved a high-level toxicologist, whether officially or unofficially. The combination of information and discussion shared through the visible networks, and the practical advice and analyses flowing through the private networks, was an essential mechanism by which toxicology was shaped by its practitioners in both Scotland

and England. This is clearly shown when examining the implications of these networks for courtroom practice. The question of how many local medical men took credit for toxicological tests actually performed by the experts is difficult to answer, but whatever the number, those who did were clearly prepared to lie by omission in court. Essentially, the networks of knowledge that were hidden from public view were used to subvert the court system; and in the process made a sizable proportion of local doctors look more competent than they really were. This appearance of widespread competency was a visible consequence of the private networks of knowledge. It is likely that this was not an intentional consequence, and there undoubtedly were local doctors who performed analyses confidently without outside help. Nevertheless, the fact that the experts were having this effect is worth considering in any examination of poisoning cases in nineteenth-century Scotland and England.

More broadly, this means that statistics regarding the testimony of toxicologists in trials are limited, in that they can show testimony, but not consultation. The fact that the invisible involvement of Britain's two most eminent toxicologists on a significant scale is proven by their own statements, is reason enough to consider that records of poisoning trials from the 1830s and 40s onward cannot be taken as complete records of all the people involved in trials. In terms of the toxicological skillset of the ordinary practitioner, the apparent willingness to keep any expert consultations out of the courtroom means that what a medical witness says they did or found cannot be taken for granted. They may have attempted a toxicological procedure, and as Jackson, Henzell, and Haselwood did, requested a second opinion before passing off their own results with full confidence. Complete court records show who testified and what they said, but it is entirely possible, if unprovable, that other experts were consulted during inquests or trials but never mentioned. A significant

proportion of court records are incomplete, for example, Tim Hitchcock and William Turkel note the extreme truncation of some Old Bailey records.[220] Taylor appears only five times over the nineteenth century, despite London being his primary place of work. However, it is clear that there was a level of exchange between the uppermost toxicologists and the ordinary practitioners that is not shown in court records.

It is worth considering the motivations of the toxicologists in maintaining these networks. Both answered many questions and performed many analyses outside of official channels, which raised questions around fees and legal obligations that could otherwise have been avoided. The answer is more likely a combination of factors, as it was in the interests of Christison and Taylor to assist their peers for several reasons. Firstly, it helped maintain their authority within the medical community, and, as the networks prove, the system was an open secret amongst practitioners. Secondly, in shoring up the testimony of ordinary medical men, Christison and Taylor were protecting the reputation of toxicology in the courtroom, upon which their reputations and livelihoods were built. This was not a phenomenon unique to toxicology, as Raf de Bont discusses the extent to which many scientific societies in England tried to control and sublimate disagreements in order to maintain a unified, cohesive image of their science.[221] Presenting a united front to the world benefitted not just the experts, but all practitioners of toxicology, making it appear far more reliable and free from controversy than was the case. In practice, the spectacle of large-scale expert clashes in the courtroom badly damaged any notion of a homogenous profession. The fact that Taylor and Christison made their admissions in the same year is

[220] Tim Hitchcock and William Turkel, 'The *Old Bailey Proceedings, 1674-1913*: Text Mining for Evidence of Court Behavior,' *Law and History Review* 34, no. 4, (2016): 929.
[221] Raf de Bont, '"Writing in Letters of Blood": Manners in Scientific Dispute in Nineteenth-Century Britain and the German Lands,' *History of Science* 51, no. 172, (2013): 314-315.

owed in some part to chance, but also to the number of high-profile, high-pressure trials that took place in the 1850s. The Palmer and Wooler cases were the first of a number of sensational cases, which also included the trials of Thomas Smethurst and Madeleine Smith, all of which caught the attention of the public in Scotland and England, and brought medical witnesses into the public eye on an unprecedented scale. Toxicology as a science was attacked during the Palmer and Smethurst trials, as large numbers of experts clashed over what appeared to the public should be easily answered questions. The 1859 trial of Thomas Smethurst was the scene of perhaps Taylor's biggest mistake in the courtroom. He had to recant the faulty evidence of poisoning he had produced, to avoid hanging an innocent man.[222] During the trial, Taylor was questioned upon previous occasions where his evidence had been contested, and his involvement in the Wooler case.[223] These trials reinforced the necessity of protecting the reputation of toxicology, as mistakes made in any trial by ordinary men or experts were brought to bear on medical witnesses in subsequent trials.

Beyond the 1850s

In subsequent decades, the evidence of private networks of knowledge is again reduced to small mentions in the medical journals. This is not surprising, and indicates nothing more than that the networks were still being successfully concealed. As suggested by these admissions, it is likely that both men continued their practice of performing analyses for and providing advice to ordinary practitioners, as there is no obvious reason for either to have stopped. Therefore, until the retirement of Christison and Taylor, it is reasonable to assume that the networks that formed under their hands continued to

[222] Leonard A. Parry, ed., *Trial of Dr. Smethurst*, (Edinburgh: William Hodge and Company, 1931), 87.
[223] Ibid, 88-89.

flourish. Again, beyond the 1850s there is not much evidence that puts these hidden networks on display, but as it was the very purpose of the experts to keep their dealings private and out of the courts, this cannot be taken as representative of their size or effectiveness. In 1874, Taylor noted that he had to turn away a request for an analysis of viscera for the police due to his retirement, instead directing the inquirer to another toxicologist of his acquaintance.[224] However, in 1875 he analysed the dubious medicine of a 'quack' for another doctor, showing that while he had retired from his work as a medical jurist, he was still active within the toxicological community.[225] The dearth of evidence also makes it impossible to establish accurately the extent to which these networks crossed national borders, whether they expanded or contracted at any point in the century, or how they were affected by the actions of other expert toxicologists. Instead, what this knowledge provides for the historian is the relative surety that there was always more exchange and interaction than official records indicate, and that the experts affected far more inquests and trials than can ever be proven.

Christison and Taylor were not the only toxicologists operating in Scotland and England by the 1850s, and it is important to consider how their contemporaries were involved in networks. The growth of medical jurisprudence in the first half of the century meant the number of toxicologists who were considered experts was significantly higher, and included Maclagan and Littlejohn senior in Scotland, as well as Herapath, Odling, Letheby, and Rees in England, to name an eminent few. Stevenson, Maclagan, and Littlejohn senior in particular took the places of Christison and Taylor as favoured expert witnesses from the 1880s onward. Watson argues that Herapath and Letheby were at their most

[224] Taylor, 'Death from Disease or Poison,' 468.
[225] William O'Neill, letter to the editor, 'Quack Medicines,' *The Lancet*, 2, (1875): 147-8.

active over a similar period to Taylor.[226] It is hard to say definitively if any of these men engaged in similar practices to Taylor and Christison, as there are no equivalent statements about private networks for evidence. However, the fact that each of them worked as medical jurists, belonged to many of the same institutions as Christison and Taylor, and held posts at universities or other tertiary education centres, shows that they certainly had the opportunities to form networks. Again, it is only possible to infer from evidence of the surface networks what might have been taking place out of sight. The same patterns in how their interactions set up opportunities for private networks are also clear when examining other toxicologists, like Maclagan. In 1845, a doctor recounted a case of hemlock poisoning, in which he consulted both Christison and Maclagan in person.[227] In 1866, Maclagan analysed chloroform for a surgeon after an unexpected death. The surgeon explained that he solicited Maclagan's help because he knew him personally through their mutual membership of the Medico-Chirurgical Society.[228] Additionally, Watson discusses the tendency of other prominent English toxicologists to keep to certain locales, which may indicate that smaller networks were maintained by toxicologists within geographic boundaries.[229] It must be considered that both Christison and Taylor were forced into making these admissions by difficult situations, thus it is pure chance that any record of their activities exists at all. That there is no other evidence of this practice is, therefore, hardly surprising; however, it does not mean that Christison and Taylor were the only toxicologists maintaining private webs of interaction. All the toxicologists and chemists who

[226] Watson, 'Medical and Chemical Expertise,' 384.
[227] John Hughes Bennett, letter to the editor, 'Dr Bennett's Case of Poisoning by Hemlock,' *Edinburgh Medical and Surgical Journal*, 64, no. 163, (1845): 170.
[228] James D. Gillespie, letter to the editor, 'Case of Death while under the Influence of Chloroform,' *Edinburgh Medical Journal*, 11, p.2, (1866): 647.
[229] Watson, 'Medical and Chemical Expertise,' 386-7.

ordinary practitioners regularly called upon for advice had their livings to make, and as was discussed in Chapters One and Two, expert witnessing was usually an unpleasant task with poor monetary reward. If they dispensed advice privately, even on a small scale, the locus of individuals in both Scotland and England would have an enormous capacity and reach between them.

This chapter has sought to illustrate that the networks of knowledge that formed within toxicology in Scotland and England were hugely influential, and reached depths that were, and remain, almost entirely hidden. This makes for an interesting scenario, where the absence of evidence is proof of existence. The consequences of this situation are far from clear-cut, and for many of the questions raised there will be no firm answers. Where the medical witnesses were determined to conceal their interactions with the experts, they generally did so successfully. This leaves the confessions of the great toxicologists as the best pieces of evidence of widespread engagement between the experts and the ordinary practitioners. While any conclusions drawn about the practices about other practitioners engaging in similar private networking practices are based largely on speculation, they certainly had the foundations upon which to forge networks, in occupying similar situations in academia and as medical jurists as Christison and Taylor, on a smaller scale. It is clear that by the middle of the century, not only had the foremost toxicologists of the day asserted their positions, but had also created sizable intellectual networks, which gave them the ability to exercise more control than any of their contemporaries over their profession. The following chapter will assess their attempts to use their positions and their networks to demarcate the roles of practitioners of toxicology, in order to make toxicology an indispensable science within the courtroom.

Chapter Five: Defining Evidence in Toxicology

The great British toxicologists were largely successful in utilizing networks to protect the reputation of toxicology in the mid-nineteenth century, but a number of issues arose that they were unable to solve by these means. This eventually precipitated a change in practice to circumvent such problems. Directly interacting with ordinary practitioners was just one way toxicologists sought to prevent mistakes being made in court. They also endeavoured to shape the behaviours of practitioners before they reached the courts through toxicological textbooks and medical journals. By laying out the duties of a toxicological practitioner with regard to different types of evidence in these texts, the authors aimed to make toxicological evidence more reliable and less open to challenge in court. Ian Burney, Neil Pemberton, Tal Golan, and Christopher Hamlin have examined the theoretical and practical difficulties of translating scientific evidence into the courtroom, and while they are relevant to this chapter, the focus here is on the set of processes that occurred before cases went to court, and the aftermath of them.[230] Ordinary practitioners confronted with poisoning cases had to observe and collect information, then formulate it into evidence before reaching court; and this process resulted in a number of dubious verdicts.

Establishing the value of evidence in criminal cases lay at the heart of this process. Practitioners had to evaluate and define what each piece of evidence could and could not prove, and how this changed when considering other pieces of evidence. Toxicological evidence was divided into five types: chemical, semiological (often called symptomology),

[230] Ian Burney and Neil Pemberton, 'Bruised Witness: Bernard Spilsbury and the Performance of Early Twentieth-Century English Forensic Pathology,' *Medical History* 55, no. 1, (2011); Golan, *Laws of Men and Laws of Nature*; Christopher Hamlin, 'Scientific Method and Expert Witnessing: Victorian Perspectives on a Modern Problem,' *Social Studies of Science* 16, no. 3, (1986).

physiological, pathological, and moral.[231] For every observation made in a poisoning case, a practitioner had to establish which category of evidence it belonged in, how conclusive it was of a poisoning diagnosis, and how much value it should be assigned when presented in a court of law. Expert witnesses often clashed over these issues in court, and while the opposition of medical witnesses made sense within a scientific context, in a court of law it threw expert witnessing as a practice into disrepute, as it was difficult for the toxicologists to reconcile their court battles with the idea that toxicology was a clear and certain science. As will be discussed, continuing controversies regarding the correct conduct of toxicology practitioners arose partly because most practitioners were not professional toxicologists, and were incapable of keeping up with an increasingly specialised profession.

Christison and Taylor's textbooks were important tools in the attempt to create clear boundaries around evidence, as these texts were required reading for medical jurists, many of whom justified their actions by referencing these works over the century. This chapter assesses how the toxicologists tried to define evidence, both in their textbooks and in case studies in the journals, then how they reacted when it became clear that reform was necessary to protect the profession. For toxicologists, defining evidence meant determining the value of different types of evidence in poisoning cases, in order to guide ordinary practitioners towards creating reliable and consistent testimony. Examining the aftermath of trials in which practitioners negotiated evidence either successfully or unsuccessfully shows how and why toxicology underwent a change in practice during the last decades of the century. Toxicologists began to encourage ordinary doctors to avoid toxicological

[231] Christison, *Treatise*, vi, 32.

testing, and instead spread the responsibility for poisoning cases across several types of professionals.

Perceptions of Toxicology

The way the courts perceived toxicological evidence in each trial was important, because errors or poor judgement made by medical witnesses in one case gave defence lawyers material with which to attack medical witnesses in the next.[232] Moreover, lawyers were trained to warp juries' perceptions of evidence, which made solid testimony even more essential. By attempting to define how practitioners should treat evidence, the top toxicologists endeavoured to prevent ordinary doctors from being manipulated into contradictions and confusion by skilled lawyers. However, the nature of toxicological evidence made it difficult to translate into court, because of the differences between the scientific and legal spheres. The discourses and processes of debate that resolved differences in the scientific community had no place in the adversarial, demanding, and exacting courtroom. In court, medical witnesses were isolated from the practices and processes that usually allowed them to reach a conclusion. While medical men could discuss and argue within the medical journals over a series of editions, in court there was no opportunity for discussion or reply, beyond the hostile cross-examination of opposition lawyers. Additionally, issues surrounding the place of toxicology as a science built around criminal detection created problems for toxicologists in court. Michael Saks and David Faigman argue that several modern forensic sciences remain underdeveloped because they are tools of the judiciary, rather than sciences in their own right.[233] Thus, these sciences

[232] The way the French 'normal arsenic' controversy crossed into Britain is a good example of this, and has been closely examined in: Ian Burney, 'Bones of Contention,' 243-59.
[233] Michael Saks and David Faigman, 'Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It,' *Annual Review of Law and Social Science* 4, (2008): 152-153.

operate based on the needs of the judiciary, and any impetus for change must therefore come from within the field itself or within the judiciary. Although their focus is modern, their conclusions shed some light on nineteenth-century toxicology as well. Toxicology was a medical science in its own right, however, its strong judicial application meant demands for certainty and rapidity took precedence over the accumulation of knowledge and hypothesis testing typical of other sciences. This contributed to how underprepared even toxicologists were in terms of presenting solid data for their conclusions, and how strongly they defended negative results as positive proof. The Palmer case and the issues it raised regarding strychnine knowledge discussed in this chapter are one example of this problem.

The scientific sphere had its own series of pressures and practices, which affected the way experts performed in the courtroom. Christopher Hamlin elaborates further on this, analysing disagreement within science as a normal phenomenon. He claims that from the perspective of scientists, disagreements are an accepted part of their work. Closely linked to this idea is the common assumption that disagreements between scientists are born of partisan interests, which is based on the fallacious idea that science holds every answer indisputably.[234] The consequences of this normal disagreement forced outside of the courtroom and into the public eye, particularly for a new science in nineteenth-century Britain, were significant. All these pressures strongly influenced the perception of toxicology in court, but the processes of evidence definition that occurred before practitioners reached court were just as important. Golan argues that the transition from the former sphere to the latter damaged the reputation of scientific evidence as a whole. He describes the result as 'a continuous parade of leading men of science zealously contradicting each other from the

[234] Hamlin, 'Scientific Method and Expert Witnessing,' 486.

witness stand, a parade that cast serious doubts on their integrity and on their science in the eyes of the legal profession and the public.'[235] This image, while evocative of the way the courtroom affected men of science, must not be taken as implying that science was more harmonious outside of the courtroom. Strategies for creating agreement and negotiating problems within the scientific sphere were certainly not fool proof, and debates on medical, chemical, and scientific issues were common within the medical journals. Therefore, the accusations that toxicologists levelled against one another, whether of partisanship, faulty practice, or poor conduct, were not due solely to the pressures of the courtroom.

Catherine Crawford argues that forensic medicine had 'exceptional visibility in a public forum.'[236] This meant sensational cases could swing public opinion in favour of or against the science. For toxicologists, making toxicological evidence as secure and accurate as possible was especially important because, as a young science, toxicology needed to first attain then retain a reputation for reliability within the courtroom. Burney and Pemberton describe the arguments that arose in twentieth-century pathology as being partly due to the instability of the body as a piece of evidence, as processes of decomposition altered the corpse and, by extension, the conclusions that could be drawn from examining it.[237] In nineteenth-century toxicology, the instability lay not just in the decomposing subject, but also in the complex and divisive processes used to investigate it. While methods of chemical testing were regularly becoming more complicated, knowledge about the symptoms, physiology and treatment of the many publicly available poisons was broadening. This

[235] Golan, *Laws of Men and Laws of Nature*, 54.
[236] Crawford, 'A Scientific Profession,' 213.
[237] Burney and Pemberton, 'Bruised Witness,' 41.

meant the reliable test of yesterday might not stand up in court tomorrow, and a solid knowledge of basic poisoning could quickly become outdated. This applied to toxicologists as well as ordinary practitioners, and was clearly demonstrated by Taylor in the Palmer case. During the trial, Taylor's rudimentary knowledge of strychnine was challenged in court, because he had 'never witnessed an instance of the action of strychnia on the human subject.' [238] The rarity of strychnine poisoning cases prior to the Palmer trial had rendered this gap in his knowledge harmless. However, the contentious nature of the case highlighted the lack of knowledge surrounding strychnine, and just prior to the trial, Taylor experimented on rabbits to support his arguments about strychnine.[239] This rapid increase of knowledge created constant issues of evidence definition and interpretation. Despite chemistry being the cornerstone of toxicology, in a significant proportion of cases the chemical evidence was inconclusive, leaving practitioners to construct diagnoses from whatever other evidence they could. Moreover, as will be examined in this chapter, the value of the different types of evidence was often unclear. Examples of ordinary practitioners leading juries to dubious verdicts through poor interpretation of the evidence gave the toxicologists plenty of reasons to attempt to prevent it wherever possible. By defining boundaries around how practitioners should treat different types of evidence in poisoning cases, the toxicologists aimed to create consistency in how evidence was gathered, and, more importantly, presented in court.

Toxicological Textbooks and Evidence

[238] Knott and Watson, *Trial of William Palmer*, 102.
[239] Ibid, 102-104.

Christison's and Taylor's textbooks on toxicology became required reading for nineteenth-century doctors, and were the first point of contact for the medical community needing chemical and procedural knowledge in poisoning cases. Thus, they were extremely influential and are important sources to examine. They were an important part of the visible networks of knowledge, disseminating knowledge and generating response through the frequent references and citations of ordinary doctors. Early works on toxicology in English were few and seldom comprehensive. Paris and Fonblanque's *Medical Jurisprudence*, and John Gordon Smith's *Principles of Forensic Medicine* contributed to the beginning of Britain's body of literature on toxicology, but none of these authors were toxicologists.[240] Although Taylor and Christison both published on toxicology as a part of works on medical jurisprudence, both gave it far more emphasis and space than previous authors had, supported by their own research, and findings from the Continent. These textbooks were one of the most effective means of influencing the toxicological practices of doctors confronted by poisoning cases.

Christison and Taylor outlined their aims and audiences in the prefaces to their works. As mentioned in Chapter Two, both men primarily targeted ordinary medical practitioners, most of whom would likely be called as expert witnesses only once or twice in their entire careers, but also students of law.[241] In his *Elements*, Taylor discussed the necessity of studying medical jurisprudence at length, to ensure public safety from criminal poisoning. He asserted that he did not wish to damage the reputations of practitioners who

[240] J. A. Paris and J. S. M. Fonblanque, *Medical Jurisprudence*, vol.2, (London: W. Phillips, 1823); John Gordon Smith, *The Principles of Forensic Medicine, Systematically Arranged and Applied to British Practice,* (London, George and Thomas Underwood, 1824).
[241] Alfred Swaine Taylor, *Elements of Medical Jurisprudence: interspaced with a copious selection of curious and instructive cases and analyses of opinions delivered at coroners' inquests*, (London: Deacon, 1843), 4.

had gone before him, as they could not help having qualified before medical jurisprudence was a field of study, but instead said 'I address myself rather to those who are engaged in their professional studies, than to those who are occupied in practice.'[242] In Christison's preface, he stated that the chemical processes he selected could be 'easily managed by the inexperienced.'[243] The toxicologists aimed to shape the next generation of medical practitioners and potential toxicologists, by impressing upon them the need for preparation for the rigours of a criminal case.

The works of Christison and Taylor had both broad reach and extraordinary longevity, and thus influenced multiple generations of medical men. Numbers of books sold are difficult to establish, however, in 1849 the *LMG* asserted that 4,000 copies of Taylor's *Medical Jurisprudence* had been sold in less than three years.[244] Additionally, the final four of thirteen editions of Taylor's works were published decades after his death, and Christison's *Treatise* was still quoted regularly in court and the journals after the final edition was published.[245] The examples of medical men referencing the texts of Christison and Taylor in medical journals, noted in Chapter Four, confirm this reach and indicate the positive reception of the texts, which can otherwise be difficult to reconstruct. However, the importance of audiences goes beyond establishing the reach of the authors. Reception and reciprocity were hugely significant, as the audiences of toxicological texts affected their contents. The authors wrote with an audience in mind, the text was mediated through processes of publication, and the audience read, interpreted, and responded to what was

[242] Ibid, 17.
[243] Robert Christison, *Treatise,* x.
[244] 'Medical Jurisprudence. By Alfred S. Taylor, F.R.S., Licentiate of the Royal College of Physicians, Member of the Royal College of Surgeons, and Professor of Medical Jurisprudence and of Chemistry in Guy's Hospital. Third Edition pp. 849. London, Churchill.,' *London Medical Gazette*, n.s., 8, (1849): 122.
[245] Coley, 'Alfred Swaine Taylor,' 414.

written; a process which shaped the next offerings of the authors.[246] This is important to consider when examining changes between the editions of the works of Christison and Taylor, as they were writing in response to the needs of a very specific audience. What they did and did not alter between editions indicates the priority they gave different aspects of their work, and their ability to make changes in different sections. For example, although chemical testing advanced rapidly throughout the century, toxicologists' ability to deal with other kinds of evidence remained stagnant, and thus those sections of their textbooks changed comparatively little against chemical sections.

Christison's 1829 *A Treatise on Poisons in Relation to Medical Jurisprudence, Physiology and the Practice of Physic* was the first publication in English to focus on poisoning, particularly criminal poisoning. It went through four editions, the final published in 1845, after which Christison ceased updating the text and it was surpassed by the publications of other authors. However, it held a monopoly on the subject of poisoning for several decades and the final edition was quoted by Taylor twenty years after it was published, showing its influence on medical witnesses was significant.[247] The *Treatise* was designed to instruct ordinary medical men in their duties as doctors to poisoning victims as well as medical jurists. Christison divided the book into 'Of General Poisoning' and 'Of Individual Poisons,' the first category dealing with evidence in poisoning cases and the latter with different poisons.[248] Christison's position as the foremost British toxicologist of the era, combined with the lack of literature on medical jurisprudence in English, influenced his target audience. He regularly referenced judicial procedure in both Scotland and England,

[246] Topham, 'Scientific Publishing,' 562-563.
[247] Alfred Swaine Taylor, 'Twelve Cases of Poisoning, Apparently from the Use of Copper for Culinary Purposes. Death from Poison or Disease after nineteen days' illness,' *Guy's Hospital Reports*, series 3, 12, (1866): 352.
[248] Christison, *Treatise*, xvii.

such as the 'investigations carried on by the Sheriff in Scotland or Coroner in England.'[249] Christison asserted that the *Treatise* was the first comprehensive work on toxicology in English of the nineteenth century, and thus was aware that his work filled a gap in British medical jurisprudence literature.[250]

The division between medical and moral evidence is particularly illuminating when assessing the boundaries of toxicology. While each type of evidence presented some difficulties to practitioners, moral evidence was particularly difficult. Moral evidence was the equivalent of what is now called motive and opportunity. Although it was an essential part of most poisoning cases, it was technically not the concern of expert witnesses, as it did not require expert knowledge to interpret. This perception of the moral evidence as semi-divorced from expert witnesses may explain why it is seldom considered at length by historians. However, the duties of doctors brought them into close proximity with not only poisoning victims, but also the pool of family members and friends who were potential suspects. Therefore, doctors were often the best witnesses of the moral evidence, and were required to give this as evidence in court. Toxicologists tried to provide guidelines as to how to reconcile giving two very different types of evidence; however, their advice was vague and contradictory. In his *Treatise,* Christison explained that 'medical witnesses have, for the most part, nothing to do with the moral proof, while, at the same time, in cases of poisoning, the medical and moral circumstances are always intimately interwoven and apt to be confounded together.'[251] This was also a comment on the danger of giving unquantifiable moral evidence the same value as quantifiable medical facts. Christison

[249] Ibid, vii-viii.
[250] Ibid, i.
[251] Ibid, 61.

defined two reasons why a practitioner should consider moral evidence, namely when aspects 'require some medical skill to appreciate them, or fall naturally under the cognisance of the physician in his quality of practitioner.'[252] This covered everything that a practitioner observed, both medical and non-medical, making it virtually impossible for a practitioner to avoid the moral evidence. The sections on moral evidence in the first and fourth editions of *Treatise* were largely identical, barring the addition of newer case examples in the later edition.[253] Christison was clearly aware of the difficulties faced by the medical men who were on the front lines of poisoning crime, but was unable to resolve them.

Other types of evidence also presented problems, as for every rule of evidence there were exceptions. Semiology, arguably the most important evidence after chemical, was described as inconclusive proof of poisoning alone, excepting a few specific situations. Christison conceded that '[symptoms] will often enable [medical men] to say that poisoning was possible, probable, or highly probable; which, when the moral evidence is very strong, may be quite enough to decide the case.'[254] The same pattern is evident in pathology, where Christison stated: 'Except in the instance of a very few poisons, the morbid appearances alone can never distinguish death by poison from the effects of natural disease, or from some other kinds of violent death.'[255] As with moral evidence, these statements remained identical in the first and last British editions of *Treatise*.[256] The increased size of the final edition came from the much longer sections on individual poisons,

[252] Ibid, 61.
[253] Ibid, 61-74; Christison, *Treatise,* 4th ed., 83-101.
[254] Christison, *Treatise*, 4th ed., 55.
[255] Ibid, 57.
[256] Christison, *Treatise*, 43; Christison, *Treatise*, 4th ed., 57

rather than the sections on how to treat evidence. Whether Christison did not think that the sections on evidence were worth updating compared to other sections on poison classification and chemical testing, or whether he did not have any changes to make to it, the result was that moral evidence remained entangled with the toxicologist's duties.

Taylor's textbooks show that he faced the same problems with evidence definition as Christison, and was equally unsuccessful at resolving them. His works on toxicology and medical jurisprudence became standard reading during his lifetime, surpassing Christison's work. Taylor published his first textbook in the late 1830s, which was the beginning of a substantial volume of works that acted as a conduit of knowledge throughout Britain. Taylor's first book, *Elements of Medical Jurisprudence,* was published in 1836, and was supposed to be the first of a two-volume work, the second of which was to have covered toxicology. Instead of the second volume, *A Manual of Medical Jurisprudence* was published in 1844, which Taylor explained was 'the completion' of the work begun in *Elements*.[257] It was Taylor's longest lasting work, spanning 13 editions.[258] Subsequently, *On Poisons in Relation to Medical Jurisprudence* was published in 1848, followed by *The Principles and Practice of Medical Jurisprudence* in 1865.[259]

Taylor's discussion of moral evidence was even briefer than Christison's. In the first edition of his *Manual*, Taylor laid out twenty-six points that a medical man faced with a case of poisoning should assess. The final point gave the vague instruction to 'Note all circumstances leading to a suspicion of suicide or murder,' which was essentially the moral

[257] Taylor, *Manual*, v.
[258] Coley, 'Alfred Swaine Taylor,' 414.
[259] Ibid, 414. Because Taylor's *Principles* was published over a much shorter period than *Manual*, and covered much of the same ground, it is less useful as a source for comparison, and has been excluded from the analysis in this chapter.

evidence.[260] In the second edition of *On Poisons*, which Taylor altered to be more practical for the medical witness, he was equally dismissive of moral evidence.[261] Despite how frequently practitioners encountered moral evidence, Taylor asserted that it did not warrant a place in his work. This was because:

> The moral and circumstantial proofs refer chiefly to the *administration* of poison by a particular party, and the *intent* of the person charged with the crime: - it is therefore considered to fall within the province of the jury alone to decide on their relevancy and value, although it must be confessed, that many of these facts can only be properly estimated by persons versed in medical science.[262]

Taylor's refusal to write on moral evidence, although it was entangled with a practitioner's duties, left medical men consulting *On Poisons* for advice with little idea about how to treat such evidence, instead having to rely on their own judgement.

His remarks on pathology, semiology, and physiology in *Manual*, were all brief, compared with the much longer section on chemical evidence. Like Christison, Taylor prefaced his remarks on aspects of medical evidence with warnings about how they could be misinterpreted, noting of redness of the viscera as a symptom of poisoning: 'It is, perhaps, sufficient to say, that no certain rule can be laid down on the subject: it must be left to the knowledge and discretion of the witness.'[263] For a doctor with little experience of post-mortems or poisoning cases, this was particularly unhelpful. Taylor's overall tone indicated that all the aspects of poison investigation were the job of the medical man, which

[260] Taylor, *Manual,* 27.
[261] Alfred Swaine Taylor, *On Poisons in Relation to Medical Jurisprudence and Medicine*, 2nd ed., (London: John Churchill, 1859), v.
[262] Ibid, 235. Italics in original.
[263] Taylor, *Manual*, 57.

relied upon the assumption that all these men were equally competent. By the tenth edition of the *Manual,* published in 1879, Taylor had changed his focus. While chemical evidence was still particularly important, there was a much longer and more detailed section on how the ordinary practitioner should deal with evidence, and how to protect his reputation in court.[264] This included discussing the limits of different kinds of evidence, specifically what they could and could not prove. The necessity of utilizing different types of evidence in combination to create a solid conclusion was made clear. Taylor did not lay down so many rules and exceptions in this edition, but instead gave general advice on evidence and examples for each specific poison. However, there were still a number of instances where he had to note exclusions and exceptions to his statements. For example, prior to discussing morbid appearances of poisoning, Taylor noted that 'both irritants and neurotics may destroy life without leaving any appreciable changes in the body. To cases such as these, the remarks about to be made do not apply.'[265] Even after fifty years, the flaws in toxicological methodology meant toxicologists could seldom make certain statements about toxicological evidence.

Comparing Taylor's sections on antimony (also described as tartar emetic) in the first and tenth editions of *Manual* shows both how far knowledge had advanced and where it still fell short. The first edition was largely speculative on symptoms and detection, because Taylor relied on several cases of Orfila's and the two British cases available to him.[266] In the tenth edition, he was aided by the thirty-seven cases available to him, sixteen of which were fatal.[267] Despite this, he still could not provide some of the most basic information. He noted

[264] Taylor, *Manual,* 10th ed., 1-43.
[265] Ibid, 65.
[266] Taylor, *Manual,* 205-206.
[267] Taylor, *Manual*, 10th ed., 132.

the variability of symptoms in acute antimonial poisoning cases: 'death may be preceded by giddiness, insensibility, great prostration of strength, and sometimes violent spasms of the muscles of the limbs, which may assume either a clonic or tetanic character.'[268] Similarly, he stated that 'The *quantity* [of antimony] actually required to destroy life is unknown,' an issue unresolved since the first edition.[269] This was particularly problematic, for, as Taylor mentioned in the introduction, practitioners were expected to be able to specify fatal doses of different poisons and confidently distinguish the symptoms of poisons from those of disease.[270] Between the first and tenth editions of *Manual*, in addition to the extra cases Taylor described, several high-profile cases of antimonial poisoning had occurred, including the trials of Thomas Smethurst and Florence Bravo.[271] The advances made between the editions indicates that the new cases provided most of the material for the changes, rather than intensive research. This supports the idea that toxicology was essentially a science driven by immediate judicial need, rather than being supported by research communities like other sciences.

Defining Evidence in Practice

In reality, determining the validity of different pieces of evidence was more difficult than the early textbooks indicated, and practitioners were left to make decisions about evidence with little immediate help. To avoid censure, they had to perform their duties as doctors and medical jurists to the highest standard. Defending counsel were apt at getting practitioners to contradict themselves or admit uncertainty on the stand, effectively

[268] Ibid, 130.
[269] Ibid, 130, italics in original; Taylor, *Manual,* 206.
[270] Taylor, *Manual*, 10th ed., 2-3.
[271] See: Parry, *Trial of Dr. Smethurst;* William Roughead, 'Malice Domestic; or the Balham Mystery: An Outline of the Bravo Case,' *Juridical Review* 39, (1927): 50-86.

destroying their credibility in court. The problems surrounding definitions of evidence that the toxicologists could not resolve in their textbooks became the problems of ordinary practitioners confronted with poisoning cases. While these men had the option of contacting a toxicologist for an analysis or opinion through the networks, this took time, and many did not apply for help. Christison and Taylor both wrote on cases where they or other practitioners had to construct diagnoses from incomplete evidence. These cases showed how unclear the values of different types of evidence were, especially with regard to moral evidence. Both men endeavoured to show how the evidence should be balanced in these writings, as well as how it should not.

The Humphrey case is an example of Christison constructing semiological and moral evidence to make up for the absence of chemical evidence. In similar circumstances to those of the Smith case, in 1831, three doctors from Aberdeen were called in to treat a patient who was suffering from what they first believed was disease, but subsequently suspected was poisoning. Upon the death of the patient, the doctors attempted tests for sulphuric acid in the viscera and on the acid-stained bedclothes, but with negative results. It is worth noting that one of the doctors was the assistant lecturer in chemistry at the University of Aberdeen, and yet the chemical testing was beyond him.[272] The evidence was sent to Christison, who used the same tests and successfully detected the acid. This, combined with persuasive moral evidence, ensured Mrs Humphrey was convicted of the murder of her husband.[273] In his article on the case, Christison was unconcerned with the doctors' failure to detect poison, and his definition of evidence was the reason why. This case was an

[272] Robert Christison, 'Cases and Observations of Medical Jurisprudence. VIII. Trial for Poisoning with Sulphuric Acid. IX. Two Trials involving the question of burning before or after death.,' *Edinburgh Medical and Surgical Journal*, 35, no. 107 (1831): 307.
[273] Ibid, 305, 308.

example of one of the few situations stated in his textbook, where semiology was conclusive without other supporting medical evidence. In his comments, he explained: 'I have on several occasions endeavoured to combat a notion which prevails among most continental jurists, as well as among practitioners in this country, whether conversant or not with toxicology, that it is impossible, without chemical evidence, to form more than a presumptive opinion in favour of poisoning.'[274] Christison wrote on the case because it served as a practical example of the views on evidence he espoused in his *Treatise*, 'illustrating the principle I have several times endeavoured to inculcate' regarding the combination of semiology and moral evidence as conclusive proof.[275] This shows that Christison used the medical journals as another method of educating the medical community beyond textbooks.

Taylor dealt with a similar case, in which the chemical evidence was lacking, but the combination of semiological and moral evidence was conclusive of poisoning. In 1867, he attended a case of poisoning, in which the death of a woman was thought to be natural until her mother suggested that the deceased had taken or been given poison. The statements of the lay-witnesses suggested the poison was phosphorous. Taylor explained how he used this to guide his investigations, stating, 'As the moral evidence rendered it probable that if any poison had been taken by the deceased, it was phosphorus, the analysis was especially directed to the detection of this substance.'[276] The chemical analysis failed to discover any trace of phosphorous, but Taylor believed that this was due to the poison being rapidly

[274] Ibid, 308-9.
[275] Ibid, 297.
[276] Alfred Swaine Taylor, 'Cases and Observations in Medical Jurisprudence,' *Guy's Hospital Reports*, series 3, 13, (1868): 248.

absorbed into the blood, leaving no trace. Therefore, when asked his opinion at the inquest, Taylor stated:

> …considering the symptoms from which the deceased suffered during her illness, the appearances found in the body of the deceased, the absence of any natural cause to account for her death… the only conclusion which I could draw was that the deceased had died from the effects of phosphorus taken or administered as a poison…[277]

Ultimately, the coroner's jury was convinced, returning a verdict of poisoning, but not stating whether it was a case of suicide, accident, or murder.[278] Although there was no guarantee of a successful prosecution, from Taylor's point of view the case was a success, as the evidence conclusively showed poisoning was the cause of death, despite the lack of chemical evidence. As discussed in the previous chapter, the cases Taylor reported in these instalments in *GHR* were generally designed to be of interest or useful to the medical community. He detailed all the aspects of evidence that allowed him to reach a conclusion and explained why they did so, providing readers with an example to follow.

These cases show how Christison and Taylor weighted incomplete evidence to create reliable testimony, but other toxicologists were less successful. Although it was possible to construct convincing evidence even with vital pieces missing, the Gulliver case was an example of the consequences of overvaluing weak evidence. In November of 1873, 73-year-old invalid Mrs Gulliver was visited by her niece Mrs Waters. Gulliver became ill the day after her niece arrived and was attended by a Doctor Walker, but she lasted only three days before dying in bed.[279] Walker certified the cause of death as heart disease, which was

[277] Ibid, 252.
[278] Ibid, 252-253.
[279] Taylor, 'Death from Disease or Poison,' 468.

confirmed by another doctor when the body was autopsied a month later for the inquest.[280] In his inquest testimony, Walker noted that he thought the body temperature of the deceased after death was unusually high, but not so significant as to cause him to doubt the cause of death. However, because the death was sudden, Julian E. D. Rodgers, the Professor of Toxicology at London Hospital College, was consulted as a toxicologist in the case. In his examination of the remains, he claimed that he found traces of morphia too small to be measured and nothing else. Despite this, he asserted that 'in consequence of this high temperature, I am of the opinion that she died from some volatile noxious substance given to her immediately prior to death. [sic] but which I am unable to detect.' [281] The jury was sufficiently convinced by his evidence to return a verdict of wilful murder, but without naming an individual as the murderer. Subsequently, the magistrate issued a warrant for the arrest of Mrs Waters, but before it could be carried out, she committed suicide using strychnine.[282]

In January 1874, the *BMJ* published an attack on Rodgers, claiming that his opinion was based almost entirely on moral evidence, and thus he overstepped his bounds as a toxicologist. The journal claimed that Rodgers' evidence of poisoning was 'one of the flimsiest suggestions of suspicion ever brought into court'.[283] Rodgers subsequently sent a letter to *The Times*, in which he defended himself against the strictures of the *BMJ*, however, he proved rather than disproved their point. The majority of the letter cited witness testimonies to prove that poisoning was probable. When Rodgers did address the chemical evidence, he essentially overruled it, claiming that the moral evidence combined

[280] Ibid, 470.
[281] 'The West Haddon Tragedy,' *British Medical Journal* 1, no. 681, (1874): 89.
[282] Taylor, 'Death from Disease or Poison,' 467.
[283] 'West Haddon Tragedy,' *British Medical Journal*, 90.

with the pathological evidence was enough to confirm poisoning: 'Although the history of the case did not show that morphia was the immediate cause of death, yet that same history would not permit me… to say that it arose from natural causes.'[284] Subsequently, several toxicologists weighed in against him, including Christison and Taylor. Following Rodgers' letter, the *BMJ* solicited opinions from three experienced toxicologists, each of whom disagreed with Rodgers. Christison, Samuel Wilks, and Walter Moxon all criticised Rodgers' evidence as being entirely unfounded.[285] Christison stated that in his experience, even if the remains of poisoning victims were proven to retain heat, it was a common result of death by disease, and thus he concluded 'I cannot… admit that such a phenomenon is any such evidence of death by poisoning, or even a just ground of suspicion of poisoning.'[286] Taylor also published a report on the trial, explaining that he had initially been asked to perform the analyses but refused, as he had retired.[287] He, too, lambasted Rodgers for his careless and unfounded accusations of poisoning. He had studied the decline of temperature after death less than a decade earlier, and used this to refute Rodgers' arguments.[288] Taylor attacked Rodgers' expert status, claiming that Rodgers' pretentions to greater skill than he actually possessed resulted in the unnecessary death of Mrs Waters:

> A man professing to act as a medical jurist is not justified in basing an opinion, carrying with it momentous consequences to the lives and reputations of others, upon any facts except those which are strictly of a *medical* nature… If a chemical expert allows his mind to be

[284] Rodgers, J. E. D. 'The West Haddon Tragedy,' *The Times*, 1874, 11.
[285] 'The Evidence in the West Haddon Tragedy,' *British Medical Journal* 1, no. 682, (1874): 125-26. Samuel Wilks and Walter Moxon were both celebrated pathologists and doctors.
[286] Robert Christison, letter to the editor, 'Correspondence. The West Haddon Tragedy: Temperature of the Body After Death,' *British Medical Journal* 1, no. 682, (1874): 125.
[287] Taylor, 'Death from Disease or Poison,' 468.
[288] Alfred Swaine Taylor and Samuel Wilks, 'On the cooling of the human body after death: inferences respecting the time of death, observations of temperature made in 100 cases,' *Guy's Hospital Reports*, series 3, 9, (1863): 180-211.

> biassed [sic] by facts or circumstances of this kind, he is almost imperceptibly led to mould his evidence so as to fit into what may be a popular theory. Some important medical facts may be ignored, while others may be unduly strained, and circumstances which should not affect his opinion at all, are made by the witness the basis of evidence which may endanger the life or liberty of another.[289]

This was exactly what Rodgers had done, stretching one brief observation of heat retention and combining it with witness testimonies to suit a theory of murder, ignoring semiology and chemical evidence to the contrary. This was despite his self-proclaimed thirty years of toxicological experience, and his position as a toxicology professor.[290] While Christison and Taylor had observed years earlier the necessity of a medical man using the moral evidence as a guide to make an accurate diagnosis, in this case Rodgers assigned moral evidence too much value, taking it as proof rather than a guide. However, Christison and Taylor's previous cases show that framing evidence was a delicate business, and it is likely that the toxicologists' standings as authorities was as persuasive as their evidence.[291] Although Taylor challenged Rodgers' claim to expertise, Rodgers was an experienced chemist and had been engaged in expert witnessing before, even testifying in the Palmer case.[292] This shows that, for toxicologists in court, there was far more skill required than just technical expertise.

Although the disagreement was ostensibly over moral and symptom based evidence, the heart of the argument was over the importance of different types of evidence, and the extent to which they should influence both doctors and juries. The *BMJ* was explicit about

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[289] Taylor, 'Death from Disease or Poison,' 482. Italics in original.
[290] Rodgers, 'West Haddon Tragedy,' 11.
[291] Robert Christison, *The Life of Sir Robert,* 1, 284.
[292] Knott and Watson, *Trial of William Palmer*, 206-207.

this, stating that it was deplorable that heat retention 'should have been allowed to have weight with a jury so far as to lead to a verdict of murder.'[293] However, Taylor's assessment of the chemical evidence showed again the difficulty involved in defining evidence. Taylor disparaged Rodgers' chemical evidence, claiming that the traces of morphia Rodgers found were likely due to his own errors, and did not exist. For this reason, he stated 'In a case of this magnitude, and involving so serious an issue, I prefer relying on conclusions derived from physiology, rather than upon speculations based on transcendental chemistry.'[294] It is important to note that Rodgers' combination of pathological and moral evidence in lieu of inconclusive chemical evidence was similar to the ways Christison and Taylor had constructed their evidence in the Humphrey and phosphorous cases. Thus, Rodgers' basic method in line with the practices of other toxicologists, which shows that there was some consensus in how to approach cases with incomplete evidence. Rodgers apparently believed that his experience justified his method; indeed, he made no attempt to justify his handling of the case or evidence. However, as Christison, Taylor, and others pointed out, his understanding of the facts of the case was faulty. This shows that even experienced men could make glaring mistakes, and that they could cause extraordinary damage when made by an authority. The Gulliver case was not the last case in which a hasty accusation from a medical man resulted in censure. In 1899, *The Lancet* criticised a doctor for making unwarranted accusations of poisoning against a grieving family, and claimed that the involvement of an expert toxicologist would have prevented the situation.[295] These trials did not prompt changes in how the law viewed or treated evidence, but did encourage toxicologists to reconsider the place of their profession in court. The recurrence of these

[293] 'West Haddon Tragedy,' *British Medical Journal*, 90.
[294] Taylor, 'Death from Disease or Poison,' 487.
[295] 'An Unsatisfactory Case,' *The Lancet*, 2, (1892): 1057.

issues in trials, despite the instruction and examples the toxicologists provided in textbooks and journals, showed that the only resolution was a significant change in practice.

Advocacy for Change

Despite the best efforts of the toxicologists, ordinary practitioners were frequently unequal to the task of being both doctors and medical jurists without direct intervention from experts. The efforts of the toxicologists to provide rules and examples through their textbooks and the medical journals were always limited by toxicology itself. As a science, toxicology in Britain had risen from non-existence to prominence within a few decades, and although the capabilities and knowledge of toxicologists grew exponentially every year, they still fell short of certainty and reliability in the courts. While this was an issue for toxicology from the very beginning, toxicologists began suggesting methods to prevent poor toxicological evidence from misleading juries more frequently in the second half of the century. A number of other factors, including changes in chemical testing, the education of medical men, the employment of expert toxicologists, and the growing role of toxicology in public health, also influenced calls for change.[296] This rapidly led to the conclusion that the division of different aspects of toxicology between different witnesses was the best way to ensure reliable testimony. This process occurred informally through private networks, and more formally, when toxicologists were summoned as expert witnesses, but the goal was making this division the default course of action in trials. By assigning different aspects of

[296] Statistics of poisoning cases during this period are not entirely reliable, see John Walliss, 'Lies, Damned Lies and Statistics? Nineteenth Century Crime Statistics for England and Wales as a Historical Source,' *History Compass* 10, no. 2, (2012): 574-583. The introduction of poison regulation legislation and the increasing detection capabilities of toxicologists support the idea that criminal poisonings were in decline. Regardless, demand for toxicology was still high because of its use in areas like food adulteration.

toxicology to specialists trained in those areas, the responsibility for dealing with poisoning cases no longer fell solely upon the shoulders of ordinary doctors.

The rapid evolution of chemical testing forced the toxicologists to encourage the split in toxicology. As discussed in Chapter Three, since the invention of the Marsh, Reinsch, and other chemical tests, they underwent near-constant revision and alteration. In attaining greater accuracy, sensitivity, and reliability, the tests became more complex, presenting a challenge even for toxicologists. By the later decades of the century, toxicologists recognised that the expectation that ordinary medical men could keep up with these advances while attending to their other duties was unreasonable. In his paper on the Wooler case, Christison stated that the reason the Darlington doctors had come to him for advice was that there were no toxicologists able to take on the case in England. He hypothesised that there were not 'a dozen medical practitioners in England' who could confidently perform the toxicological tests.[297] Christison recognised the pitfalls in expecting ordinary medical practitioners to be accomplished toxicologists, and suggested a solution:

> There is, indeed, no probable remedy… except the division of labour; by which chemico-legal duties, separated from the medico-legal, may be put into the hands of the pharmaceutic chemist, to whose province such duties will be appropriately attached, so soon as his education and his position in society in this country shall be duly elevated.[298]

Toxicological testing had, in Christison's experience, outstripped the capabilities of doctors very quickly, leaving them open to unwarranted censure when they were placed in a position like that of the Darlington doctors; unable to perform the tests themselves, and completely reliant on outside help. Christison believed the men acted correctly, and blamed

[297] Christison, 'Account of a Late Remarkable Trial,' 713-714.
[298] Ibid, 715.

poor organisation amongst the medical profession and legislature for the men having had no toxicologist to refer to in their immediate area.[299] Despite raising these concerns in 1855, it was decades before any real division of labour in toxicology occurred.

As toxicology became more technically complex, the nature of expert witnessing was questioned by toxicologists, who realised that the men giving toxicological testimony as experts very seldom were experts. In his remarks on the Gulliver case, Taylor argued that calling all medical witnesses 'experts' was dangerous, because: 'Any statement strongly made on oath by one calling himself an expert or professor, will be generally accepted, although he may be only half qualified, and really have had no experience on the actual points involved in the questions submitted to him.'[300] By extension, he stated that expert testimony given by non-experts was both dangerous to the accused and deleterious to the profession. He claimed that problems arose because

> The qualifications of the individual who undertakes the analysis are not sufficiently inquired into. A surgeon may thus be called upon to answer abstruse chemical questions, and a chemist may be asked to state his views on subjects purely medical or pathological and requiring special medical experience.[301]

Regarding any professionally trained man as having qualifications to answer questions in all the relevant sciences of toxicology was the foundation of the problem. Taylor echoed Walter Moxon's proposed remedy for the situation, namely the involvement of a third party educated on medical facts, such as the coroner or a government official, so that they could recognise misleading expert testimony.[302] This was not a practical solution however, as

[299] Ibid, 713-714.
[300] Taylor, 'Death from Disease or Poison,' 483.
[301] Ibid, 483-484.
[302] Ibid, 483; Walter Moxon, letter to the editor, 'Correspondence. The West Haddon Tragedy,' 126.

Taylor knew from experience that even the top experts were liable to clash over toxicological issues. By the publication of the tenth edition of *Manual* in 1879, just three years before Taylor's death, his recommendations were closer to Christison's. He explained that it was perfectly natural for an ordinary medical man to feel unequal to performing chemical analysis, and the best option was to refuse the task, instead passing it onto professionals, such as 'chemical experts or Medical Officers of Health.'[303] Comparing his position in 1879 to his 1846 insistence on the self-sufficiency of ordinary medical witnesses discussed in Chapter Three shows how starkly Taylor had changed his position. Despite these attempts to encourage change, without significant modification of medical education and the definition of expert witnesses in court, the issues damaging toxicology's reputation persisted.

After the deaths of Taylor and Christison, in 1880 and 1882 respectively, their successors continued pushing for practical change.[304] In a paper read before the Medico-Chirurgical Society in 1884, Littlejohn senior outlined the duties of the doctor, including 'making himself acquainted with the SYMPTOMS of the leading poisons… and performing the post-mortem, which should be conducted on the ordinary principles laid down in the textbooks.'[305] He was clear on the place of chemical evidence, stating:

> As to the CHEMICAL ANALYSIS, we would strongly advise the general practitioner to have nothing to do with it. It is impossible in the hurry of practice to keep up our acquaintance with chemical tests; and so rapid has been the progress of chemistry, that even since the

[303] Taylor, *Manual*, 10th ed., 18.
[304] 'Obituary. Alfred Swaine Taylor.,' *British Medical Journal*, 905-6; 'Obituary. Sir Robert Christison, Bart., M.D., D.C. L., LL.D., Physician in Ordinary to the Queen in Scotland: Vice-President of the British Medical Association, etc.,' *British Medical Journal* 1, no. 1102, (1882): 214-5.
[305] Henry Duncan Littlejohn, 'The practice of medical jurisprudence, no. 1, toxicology: with hints as to the conduct of medical practitioners,' *Edinburgh Medical Journal*, 31, p.2, (1885): 97-98. Capitalisation in original.

> comparatively recent death of Taylor, analysis, both qualitative and quantitative, has made great progress, and… is attended with unusual difficulties, depending on the nicety of the processes and the delicate nature of the experiments.[306]

He asserted that the only way to avoid the 'ordeal' of cross-examination, potentially damaging to a doctor's evidence and reputation, was to refuse to perform the chemical tests in any case of suspected poisoning. At most, using 'a little knowledge of chemistry,' a doctor could perform the most basic of experiments, which could then direct the more complex tests of toxicologists.[307] Littlejohn submitted that the best option was for practitioners to contact a procurator fiscal and verbally state their suspicions of poisoning, which protected them against accusations of misconduct and shifted the burden of investigation from their shoulders.[308] In 1887, *The Lancet* continued the argument along the same lines as the toxicologists. It suggested that, by default, every inquest should have the testimony of a local medical man and an expert medical jurist, the latter to provide the local man with 'valuable assistance at a time when it is much needed.'[309] If adopted, this system would ensure that at least one of the medical witnesses was a true expert.

Ultimately, change was slow, but by the end of the century, division of labour was beginning to become reality. A number of developments laid the foundations for the change that toxicologists had been advocating for years. The shift in medical education towards public health and away from medical jurisprudence was discussed in Chapter One. This meant fewer academic positions available for aspiring medical jurists, cutting down the pool of academic toxicologists who had been the main resource for expertise in poisoning cases

[306] Ibid, 98. Capitalisation in original.
[307] Ibid, 98-9.
[308] Ibid, 102.
[309] 'Reform of the Coroner's Court,' *The Lancet*, 1, (1887): 991.

throughout the century. Adam states that in their place were the public analysts, created by the *Adulteration of Food and Drink Act (1860)*. She notes that these analyst positions were not taken seriously until the 1870s.[310] Toxicology thus became increasingly fused with public health, as the double duties many toxicologists had taken up were consolidated in these positions. The increase in toxicologists and analytical chemists taking positions as government analysts created a new administrative division between the lower and upper tier of practitioners. Christison and Taylor both had working relationships with Crown prosecution services, but neither were employed permanently, rather consulted on a case-by-case basis. Christison described himself as 'unacknowledged standing medical council "for his Majesty's interest",' while the Home Office requisitioned Taylor's services as early as 1866.[311] This largely informal relationship was solidified with the creation of the position of Scientific Analyst to the Home Office in 1882, to which Taylor's successor Thomas Stevenson was appointed.[312] Adam describes how new Home Office Analysts were chosen 'through a system that was effectively an apprenticeship.'[313] Other toxicologists were awarded government positions as well, with Odling becoming a MOH, Maclagan taking the position of Medical Adviser to the Crown on Criminal Cases, and Littlejohn holding both positions.[314] Crowther and White note that after the nineteenth century, the vast majority of toxicologists were employed in Home Office and police laboratories.[315] Absorbing expert toxicologists into a branch of government made them an official resource for general

[310] Adam, *A History of Forensic Science,* 157-8.
[311] Christison, *The Life of Sir Robert,* vol.1, 283; Taylor, 'Twelve Cases of Poisoning,' 329.
[312] Adam, *A History of Forensic Science*, 156.
[313] Ibid, 157.
[314] John L. Thornton and Anna Wiles, 'William Odling, 1829-1921,' *Annals of Science* 12, no. 4, (1956): 288; 'Obituary. Sir Andrew Douglas Maclagan,' *British Medical Journal*, 936; Tait, 'Sir Henry Duncan Littlejohn,' 183, 187.
[315] Crowther and White, *Soul and Conscience*, 136.

practitioners to consult, which undoubtedly affected the private networks discussed in Chapter Four. Potter's argument that networks were affected by institutions is most relevant for toxicology during this period.[316] As the men who had acted as an informal resource for ordinary medical men were amalgamated into the government, they were subject to the requirements and limitations of their new roles. It is unlikely that they had the same capacity for informal interactions as their independent predecessors, as their time was subject to the government, but it is impossible to be certain.

This increasing specialisation split toxicological science down evidence divisions. Ordinary doctors of the lower tier were expected to deal with symptoms and moral evidence, while upper tier toxicologists retained sole dominion over the chemical analysis and linked physiological evidence. This left ordinary doctors dealing with the kinds of evidence that were more naturally suited to their training. While moral evidence and semiology were still difficult types of evidence to deal with, it was a doctor's duty to deal with symptoms of illness and consult with family members, and did not require special knowledge outside the norm of medical practice. Littlejohn's direction to ordinary practitioners to consult experts as a matter of course in 1884, suggests that he believed there was a sufficient supply to meet the demand by that time. Less than a decade later, pathology began branching into a separate domain, with demands for specialised expertise creating tangible results by the 1890s.[317] This removed yet another of the general practitioners' responsibilities in poisoning cases. It also signalled the rapidly approaching end of the era of independent expert toxicologists. It is worth noting that, compared to

[316] Potter, 'Webs, Networks, and Systems,' 621-622.
[317] Ian Burney and Neil Pemberton, *Murder and the Making of English CSI*, (Maryland: John Hopkins University Press, 2016), 61.

areas like public health; the process of bureaucratic integration for toxicology was significantly slower, reflecting the perception of toxicology as a science less beneficial to the public.

From the 1850s, toxicologists' attempts to maintain the integrity of their science became focussed on delegation, rather than education. The nature of criminal poisoning meant that in each case, different aspects of toxicology gained different weight, negating the efforts of toxicologists to lay down firm rules as to how each aspect of evidence should be treated. The difficulty toxicologists had in defining the boundaries of evidence for ordinary practitioners was the result of toxicology being an amalgamation of different sciences, rather than a cohesive whole. Each science developed quickly, making toxicological testing more reliable but also far more complex, while interpreting aspects like moral evidence relied upon the experience and discretion of individual practitioners. Despite aiming their textbooks at ordinary medical men, Christison and Taylor clearly realised that it was impossible for doctors to keep up with the increasing demands of toxicology. After having encouraged toxicology into the mainstream of medical practice, both men argued for shifting the most complicated aspects out of the realm of ordinary medical men in every instance. Thus, toxicology was split into its composite parts, with the most technically complex aspects of toxicology delegated to those with special training. This secured the places of the expert toxicologists who were employed by the state, which was important given the dwindling of positions in medical jurisprudence in medical education. In essence, toxicology was still a young science, developing too rapidly for ordinary medical men, and yet not fast enough for the demands of accuracy and certainty of the law. This realisation, and action to prevent future miscarriages of justice, set the trajectory for the development of toxicology through the twentieth century. In attempting to solve problems of evidence

definition, toxicologists were redefining the roles of ordinary practitioners in poisoning cases, which in turn altered their own roles.

Conclusion

> [A] medical jurist should have a theoretical and practical knowledge of all the branches of the profession, a large range of experience, and the rare power of adapting his knowledge and experience to emergencies. He should be able to elucidate any difficult medico-legal question that may arise, and be prepared at all times to make a cautious selection of such medical facts, and a proper application of such medical principles… to enable a jury to arrive at a just conclusion.[318]

This demanding definition of an ideal expert witness was laid out in the twelfth edition of Taylor's *Manual*, edited by his successor Thomas Stevenson. Published more than sixty years after the first edition of Christison's *Treatise*, the *Manual's* expectations of a witness in print were at odds with developments in the profession, and did not reflect the many changes that occurred over the century. In reality, the medical witness described by the twelfth *Manual* in 1891 was a rarity, as the vast majority of witnesses were no better than adequate, and frequently incompetent. By 1891, the duties of death investigation were spread between the ranks of analysts, doctors, and pathologists. Indeed, Taylor conceded in subsequent pages that ordinary medical men should not have to shoulder the entire burden of expert witnessing in poisoning cases.

For the vast majority of medical witnesses, Christison's 1829 definition of a single man's experience as a 'feeble light' was still more accurate. Medical men were heavily reliant on authorities, because, as Chapter One discussed, their education was insufficient to forge them into Taylor's ideal jurist. The difference between Taylor's definition and his concession in later pages represents the divide between expectations of what medical

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[318] Alfred Swaine Taylor, *Manual of Medical Jurisprudence*, ed. Thomas Stevenson, 12th ed. (London: J & A Churchill, 1891), 1.

education would make of medical men, and the subsequent overestimation of these men in the eyes of the law. The medical education and legal systems of Scotland and England provide essential context for developments in toxicology. They were the external frameworks that had the most influence over toxicology throughout the century. Medical education was supposed to prepare medical men for their encounters with poisoning crime, so that they could operate as impartial experts for the legal system. However, the consistently low priority medical teaching and licencing bodies placed on medical jurisprudence meant that even if students received a solid theoretical grounding in toxicology, they were unlikely to have any practical experience with the tests, post mortems, or any other aspects of the subject that required more than theoretical knowledge. This created a significant problem, as the low expectations of the medical profession clashed with how the law perceived medical men. Chapter Two highlighted that although Scotland and England had distinct legal systems, they shared the assumption that all medical men were equally competent to perform as medical jurists. Thus, medical men who received a brief theoretical grounding in toxicology could be called upon to perform the role of toxicologists in court. This had a detrimental effect on the course of justice in both countries. The gulf between medical and legal understandings of competency in toxicology was the primary cause of the problems toxicology encountered throughout the century.

Toxicologists' attempts to portray themselves as authorities at the head of a toxicological profession had several important effects. Chapter Three outlined how, in setting themselves apart from ordinary practitioners as true expert toxicologist, Christison and Taylor divided the Scottish and English professions into Burney's two tiers. This new division made it easier for ordinary practitioners to seek help, but in supplanting the practitioners who had previously been considered the top experts, Christison and Taylor

also created friction in the profession, which sometimes played out publicly, as in Christison's argument with Mackintosh. Additionally, they created an internal structure that was only recognised tacitly by the law. While all medical men were legally equal, in practice the legal profession and lay-juries acknowledged the superiority of Christison and Taylor, requesting their assistance in difficult cases. This divide set a pattern for how toxicology practitioners interacted with one another throughout the century. The interactions between experts and ordinary practitioners reflected both the new internal structure and the informal legal recognition of this. The creation of public and private networks within and across Scotland and England stemmed from this divide, and showed the interconnectedness of the toxicology professions. Chapter Four focussed on the private networks as they were especially important for what they reveal about the relationship between the tiers of practitioners, and the effect their interactions had on poisoning cases. Christison's admission that he was deliberately influencing poisoning cases without testifying reveals much about his position as an authority and the licence this gave him. These interactions were essentially a defence mechanism for both parties involved. For toxicologists, this saved time and effort, and for ordinary practitioners, they could present their results in court with confidence, and were far less likely to suffer the consequences of being accused of incompetency. There is a strong likelihood that other practitioners, including Taylor, were also influencing more trials than court records indicate, which has significant implications for analysis of court records and study of the professional structure of toxicology. However, despite the success of networks in protecting the reputation of toxicology in court, issues surrounding definitions of evidence continued to prove problematic. Chapter Five argued that these issues were symptomatic of larger problems regarding the role of toxicology and its practitioners in court. Toxicologists recognised that the range of skills and experience

toxicology practitioners were supposed to have was unreasonably large, and as a result was affecting the quality of courtroom testimony. They began to advocate for reducing the responsibilities of ordinary practitioners in poisoning cases, by spreading duties through multiple experts. At the same time, the government was incorporating analysts and toxicologists into official positions, making this division of labour possible. This change signalled a new era in toxicology, as the roles of both toxicologists and ordinary practitioners were redefined, changing the way they interacted going into the twentieth century.

This thesis has argued that the toxicology professions of Scotland and England were shaped by the interactions of toxicology practitioners. These interactions were essential because of the nature of toxicology: a complex, time-consuming, rapidly evolving science, which was difficult to master. Tracing the interactions reveals the parallel development of toxicology in Scotland and England, and displays the extent of the overlap between the two countries. This crossover shows that while some aspects of toxicology were specifically Scottish or English, others were too close to be separated, and are better defined as British. The trends in creation of authority, informal interactions between practitioners, and the redefinition of the role of toxicology in the last decades of the century were shared by both countries, creating consistent similarities between the toxicology professions of each. Therefore, the interactions of Scottish and English toxicology practitioners constituted not just national toxicology professions, but a broader British toxicology, unified despite national borders.

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